DOCUMENT RESUME

ED 072 570 EC 050 923

AUTHOR	McCoy, George F.
TITLE	Diagnostic Evaluation and Educational Programing for Hearing Impaired Children.
SPONS AGENCY	Illinois State Office of the Superintendent of Public Instruction, Springfield.
PUB DATE	15 Jan 72
NOTE	78p.
EDRS PRICE	MF-$0.65 HC-$3.29
DESCRIPTORS	*Audiology; Auditory Tests; *Aurally Handicapped; Clinical Diagnosis; Educational Planning; *Exceptional Child Services; Hearing Loss; *Medical Evaluation; *Psychological Evaluation; Social Work

ABSTRACT

Various aspects of diagnostic evaluation and educational programing for hearing impaired children are described. Discussion of hearing disorders from a medical perspective covers anatomy of the ear, types and causes of hearing disorders, and medical and surgical treatment. A review of audiological assessment of hearing disorders focuses upon techniques for measuring degree of hearing. Examples of hearing tests are given, audiometry and the audiogram are explained, hearing losses are classified by degree of loss, and familiarization training in use of amplification is described. Case work services for the hearing impaired are considered in terms of delivery, coordination and integration functions, working with both parents and the child, inter-professional consultation, and placement services. Discussion of psychological evaluation touches upon psychological services in the schools, methods of evaluating the hearing impaired, and working with parents. Finally, educational programing is considered (educational classification of hearing loss, educational approaches, choice of communication methods, examples of facilities, and educational objectives). (KW)

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Illinois State University

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To the dedicated and untiring teachers of the auditorily impaired

Funding for this publication provided by Special Study Project #503, Title VI Programs, Elementary and Secondary Education Act, Office of the Illinois Superintendent of Public Instruction

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Printed by Donnell Printing Company, Pontiac, Illinois 61764

INTRODUCTION

Persons working with the auditorily impaired soon realize the necessity for coordinating the skills of the otologist, audiologist, psychologist, social worker and special teacher. Putting together an effective educational program for children with hearing losses is a task that demands the best of available information and techniques. Medical, technological, and psychological findings and corrective procedures must be carried out in cooperation with the child's family and assume a final form in the classroom. This is a complex and lengthy process. The several professional specialists who must contribute to the program often have little contact with the hearing impaired and are seldom accustomed to working as a team.

In the interests of securing the benefits of the team approach in educating the hearing impaired child, a grant of money was made by the Office of the Illinois Superintendent of Public Instruction, Title VI Programs, Elementary and Secondary Education Act, Mr. James E. Selinger, Director. Approval of the grant, made in consultation with Mr. David W. Donald of the Department of Special Educational Services and Mr. Dennis E. Kelly of the Department of Pupil Personnel Services from the Office of the Illinois Superintendent of Public Instruction, allowed for costs of publishing the content of the proceedings. Teachers, social workers, nurses, and psychologists were brought together for an intensive two-week special training institute. The thirty-six trainees were assigned to nine inter-disciplinary teams. After hearing an orientation and watching demonstrations from a group of consultants, the teams were assigned a hearing impaired

child and parent for work-up. The consultant staff provided supervision and contributed suggestions in the final phase of the institute, staffing conferences in which each team outlined an educational program for their child on the basis of findings obtained by each team member.

The consultant staff for the institute included:

Jack Clemis, M.D., Otologist

Earl Harford, Ph.D., Audiologist

James Mooney, M.S., Psychologist

Dorothy Rowand, M.S.W., Social worker

Mary Lou Koelkebeck, M.S., Educator

Carlene Roberts, M.S.W., Co-director and social work consultant

George McCoy, Ph.D., Director and psychologist consultant

The feeling of the participants was that the information and points of view exchanged in the training sessions should be shared with all others who work with the education of the hearing impaired child. The arrangement with the consultant staff had not included time for the considerable work of editorial preparation of their materials. Accordingly, the director assumed the task of compiling the institute coverage for publication. In so doing, I accept responsibility for the errors in the text while acknowledging credit to the consultant staff for the good ideas they supplied.

George F. McCoy, Ph.D.
15 January 1972
Illinois State University

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CHAPTER I. MEDICAL PERSPECTIVE OF HEARING DISORDERS

This discussion will present a brief review of the ear and its surrounding parts in order to establish an awareness of the primary structures which are concerned with hearing. Although rather small in comparison to other body components, the ear is a complex organ with components specialized for the reception, amplification, and transmission of sound. Hearing is dependent on the integration of all these functions. Defects or damage to the organic structures involved in hearing result in disorders in hearing. The treatment of hearing disorders involves medical and educational procedures. The preliminary diagnostic assessment of the hearing disorder often indicates the necessity for an approach blending medical treatment and special training in order to achieve optimal correction of the disability. Carrying out an integrated treatment program is facilitated when each member of the specialist team has a basic understanding of the contributions to be made by other professional persons on the treatment team.

Physical characteristics of sound. Sound is a form of energy. It is created when some force strikes an object with intensity sufficient to set up vibrations. The energy which the force represents is thus converted to movement which spreads out as waves, each wave peak representing the peak strength of the originating vibration. The vibrations are carried along by molecules of the air and continue until they strike another object where the entire process of energy conversion may be repeated.

The pulsating movement of the vibrations which we recognize as sound accounts for particular characteristics which are ascribed to sound. These attributes are frequency, intensity, and spectrum. Frequency tells the number of waves occuring in each sound. Intensity designates the strength of the vibrations, generally reported as units called "decibels" (abbreviated as "dB"). Spectrum refers to the patterning or the massing and arrangements of the vibrations.

Hearing. The sounds of greatest concern to us are those which make up speech. If not a uniquely human function, *speech*, as the common method for communication, is a highly developed human activity. *Hearing* is the ability to respond to sound, and especially to those sounds having frequencies of 250 to 2,500 cycles per second which is the speech range. Inability to respond to sound in the speech range is termed a hearing disorder. Associated with the hearing disorder is impaired language and an underlying defect of the auditory mechanism, the ear.

Anatomy of the Ear

A general acquaintance with the auditory mechanism, how the components function, and what can go wrong, is requisite to the correction of hearing disorders. Even though the restoration of hearing is a complex matter demanding the integrated skills of audiolo-

gists, special educators and other professionals, treatment of defects of the ear is the concern of the physician. Physician specialists in the area of otolaryngology and otology are those usually contacted. The auditory mechanism includes the three divisions of the ear and surrounding bone structures.

External ear. The most obvious of the three divisions of the ear is the visible auricle (pinna) and the canal (acoustic meatus) which

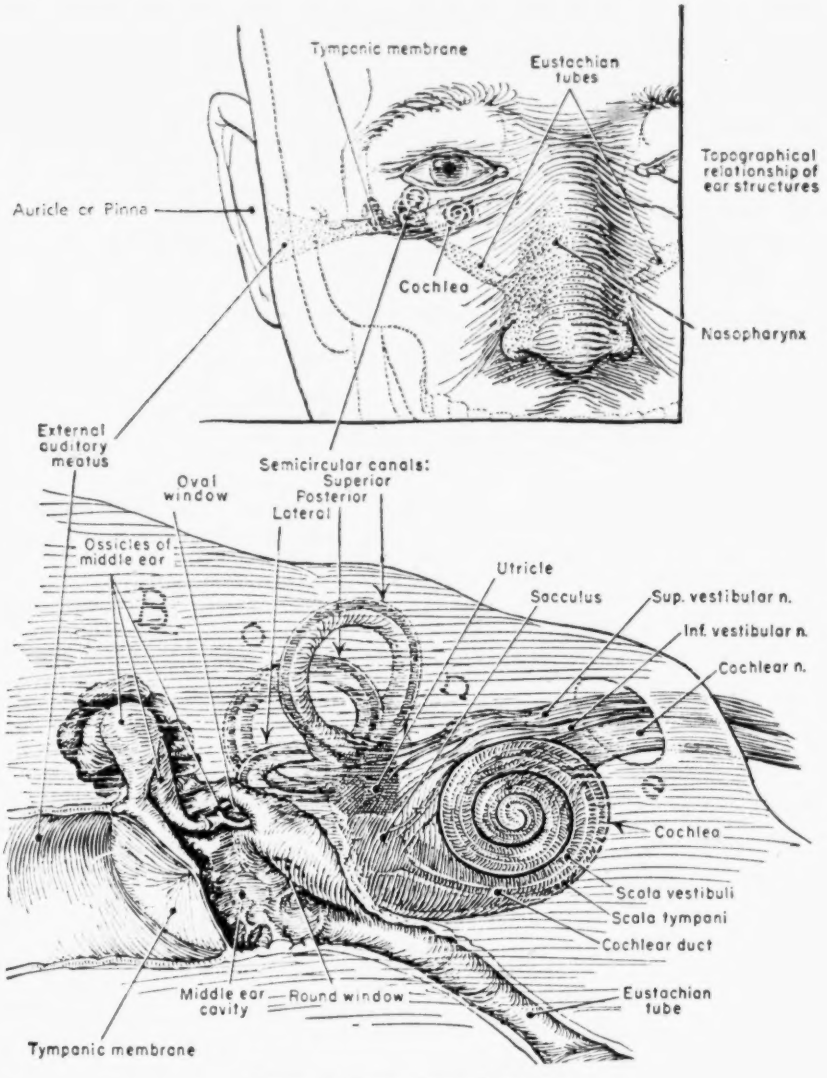

Figure 1. Structures of the Ear.

leads to the middle ear. The external ear is essentially a funnel with the flap-like auricle serving as a large mouth of the funnel. Sound picked up by the auricle is directed to the canal which is an "S" shaped tube about one inch in length and with a diameter of less than $\frac{1}{4}$ inch. Located along the walls of the canal are hairs and wax (cerumen) normally secreted by the cells. The configuration of the canal, the small diameter, the strong hairs, and the sticky wax are all intended to allow passage of sound while protecting the delicate membrane located at the end of the canal.

Middle ear. The approximately $\frac{1}{2}$ inch long bony capsule frequently referred to as the "ear drum" is medial in location as a division of the ear. At the external opening is the thin sheath (tympanic membrane) which closes the external canal and covers the middle ear. At the internal opening of the middle ear cavity, three tiny bones (ossicles) and operating muscles and nerves are located on the footplate. These bones oscillate in response to the sound that is carried to them and transmit and render the sound suitable for pick up by the organ of hearing (cochlea) of the inner ear. The ossicles are known as the hammer (malleus), anvil (incus) and stirrup (stapes). The malleus is attached to the tympanic membrane and moves with it. The tensor tympani muscle (fifth cranial nerve) controls the movement of the tensor membrane. The stapedius muscle (seventh cranial nerve) operates the stapes.

The eustachian tube leads from the middle ear to the nasopharynx and serves to ventilate the middle ear space. The porous bone surrounding the middle and inner ear cavities is part of the mastoid process. The mastoid bone is very thin and consequently is highly susceptible to damage, penetration, and erosion.

Inner ear. The innermost division of the ear is also a small bony capsule filled with a fluid (perilymph) which circulates with the spinal fluid, through a connection with the central nervous system. Floating in the perilymph is the labyrinth, a membrane encasing the organ of balance (vestibular apparatus, made up of utricle, saccule, and semicircular canals) the organ of hearing (cochlea, made up of the organ of Corti, hair cells, and endolymph fluid), and the endings of the eighth cranial nerve. The posterior branch of the eighth nerve attaches to the vestibular apparatus and the anterior branch connects to the hair cells of the organ of hearing. Movements of the ossicle bones are carried to the inner ear through the small opening (fenestra) of the stapes bone.

Physiology of hearing. Hearing is the end result of a series of functions which include reception, amplification, transmission, integration, and interpretation of sound. The manner in which these operations are carried out is not known specifically. Mechanical, chemical, and electrical processes are involved. Normally, sound waves picked up by the auricle are conveyed through the external canal to the tympanic membrane. Striking sound waves set the tympanic membrane to vibrating and the motion is transferred to the ossicles. Some regula-

tion of the sound waves occurs at that point with intense sounds being reduced and weaker sounds being strengthened. The movement of the ossicles is then passed to the fluid of the inner ear. The motion of the fluid sets up waves in the hair cells of the organ of Corti and the oscillating of the hair cells stimulates fibers in the acoustic branch of the eighth cranial nerve. When the sound waves reach the eighth cranial nerve, subsequent conduction of the sound waves occurs by chemical and electrical methods.

Although the sound waves are usually conducted to the middle and inner ear by air, the porous bone and fluid surrounding the middle and inner ear divisions are capable of transmitting sound. When transmitted by these bony tissues, the energy of the sound wave is subjected to absorption by the fluid-filled bony cavities. As a consequence, sound reaching the eighth cranial nerve by the bone conduction route tends to be distorted and weakened. Measuring bone conduction can have importance as a technique for ascertaining the functional intactness of other parts of the ear.

Disorders of Hearing

Functions of the ear. Hearing impairment can be better understood by a review which considers what the various parts of the ear are supposed to do and how the particular function is accomplished. The auricle is designed to concentrate and deliver sound waves to the external ear canal. Occasional losses of the auricle due to congenital or accidental factors seem to have relatively little consequence other than to reduce effectiveness in localizing sound. Obstruction of the external ear canal will interfere with the passage of sound until the blockage is removed. The transductive functions of the middle ear are susceptible to interference from a number of conditions. Changes in the air pressure within the middle ear cavity such as may normally be experienced when diving in deep water or on sudden descent from higher altitudes can reduce the vibrations of the tympanic membrane. Movement of the ossicle bones and the tympanic membrane is slowed when fluids accumulate in the middle ear cavity. Changes in air pressure or fluid accumulation typically accompany blockage of the eustachian tube which ordinarily acts as a kind of relief valve for the middle ear cavity. A hole piercing the tympanic membrane or changes that lead to a softening or hardening of the ossicles will also reduce the effectiveness of middle ear components to transduce sound.

In the inner ear, sound as energy waves of motion is converted to equivalent chemical and electrical energy for transmission within the central nervous system. This conversion may be impeded by changes in the pressure of the surrounding endolymph or perilymph fluids when their normal circulation channels are blocked. The most serious impairments to the functions of the inner ear are consequences of damage to the nerve endings, hair cells, and membranes of the organ of Corti. This frequently occurs as some type of erosive

loss or may occur as a traumatic injury such as from a penetrating injury or crushing wound. Failures in the conversion-transmission functions of the inner ear usually involve damage to nerve tissues and thus are generally not correctible. The actual degree of loss of hearing, however, is proportional to the amount of nerve tissue damage. In some instances, a portion of the nerve tissue is undamaged and is available for normal functions, while operating at a comparably reduced level.

Types of Hearing Disorders

As is the case for most conditions, there exist several systems for classifying hearing disorders. The various categories are revealing of the background and orientation of the professional persons who apply the classification, or "make the diagnosis." The existence of several groups of categories or diagnoses is not intended to spur a detailed consideration of which classification is the correct one. Such exercises have little practical value. The presence of multiple classificatory schemes is simply a manifestation of the fact that a hearing disorder may be regarded from several points of view. Medical, educational, actuarial and rehabilitative are examples of a few of the ways that a disorder may be approached. In any given situation, or for specified purposes, one classification may have greater significance than does some other diagnosis. The advantage may be that of communicating certain characteristics or it may be one of indicating particular treatment procedures.

Early medical classifications tended to emphasize the origins of disorders since information about causes would have direct implications for treatment and control. Hearing disorders associated with defects present at birth were designated as *congenital* losses. Congenital losses were attributed to hereditary causes and to developmental failures which were not generally amenable to correction. Damage to the auditory nerve was frequent. Excessive narrowness of the external ear canal (stenosis), or failure of the canal to develop at all (atresia) are also examples of congenital losses. Other examples are the fusing of the ossicles, ossification of membranes or cochlea, and anomalous absence of divisions or components of the ear. *Acquired* hearing disorders were those losses resulting from conditions occurring after birth. Damage resulting from injuries, illnesses, or metabolic factors usually involved only parts of the auditory apparatus and the ensuing hearing loss was partial rather than total. Prospects for favorable treatment outcomes were good since damage to the auditory nerve was usually slight.

Conductive hearing disorders. Advances in the treatment of hearing disorders have made it necessary to supplement the earlier classification of hearing disorders. The extension takes into account some of the functional characteristics of the ear. The outer and middle ear have been identified as carrying out the function of delivering sound to the inner ear. Any impairment of the middle or outer ear divisions

is designated as a conductive loss. The defect is essentially mechanical in nature. Blocking or plugging of the external canal, blocking of the eustachian tube, or distortions of the normal air-fluid pressure balances are some examples. Conveyance of sound via the boney processes and fluids surrounding the middle ear is normal. Conductive losses are often temporary and generally offer good prospects for correction.

Characteristics of conductive losses. Conductive hearing losses are difficult to identify on the basis of observation alone for persons having such losses hear at a uniform level. So long as the sound is loud enough, discrimination of all speech sounds is smooth and complete. Persons having conductive hearing losses frequently complain of head noises, ringing and buzzing (tinnitus). Unexpectedly, an individual with a moderate conductive loss may talk in a low volume because he hears himself very well by means of bone conduction. More surprising, a person who has a conductive loss may actually understand speech against a noise background better than does a person with normal hearing. This phenomenon occurs when the conductive loss masks or "cuts out" the annoying interferences of the background noise.

Sensori-neural hearing disorders. Impairments to the inner ear involve damage to the auditory nerve and the consequences are usually more profound than those seen in association with conductive losses. At the present time, no method for correcting nerve damage has been perfected. Since it is the nerve that is damaged, air and bone conduction routes do not differ. The auditory nerve may be injured by the direct force of injuries, action of toxins or poisons, errosive attacks of pathogens, or high temperatures. The defect is degenerative in nature. The damage producing process can be stopped, but the damage is not repairable. Even though the damage is permanent, a small amount of tissue may remain functional and intact. A limited amount of ability to hear is permitted by the intact tissues. This residual is the basis for subsequent rehabilitative effort.

Characteristics of sensori-neural losses. Although sensori-neural losses are very consistent and stable over time, they represent features which are sometimes individually unique. Speech acquisition is imperfect and expressed speech is impaired. The individual with a sensori-neural loss speaks in a loud voice. Some speech sounds are heard while others are not. High frequency sounds, such as are related to the consonants "c," "f," and "s," are not heard. The words "cake," "fake," or "sake" may thus all sound alike. Vowel sounds are generally received and discriminated adequately. Ability to interpret speech sounds against a background of noise is markedly ineffectual because background noises may be magnified to even greater intensities.

Integrative hearing losses. Also designated as "central hearing loss," this type of disorder results from damage to the auditory nerve or its

pathways within the brain. All the three divisions of the ear (outer, middle, and inner) are generally intact and normal. Injury to the auditory nerve may come from the trauma of accidents, infections, toxins, and metabolic disorders. Since damage to nerve tissue cannot be corrected at present, there is frequently little value in attempting to localize the exact point of injury.

Characteristics of integrative hearing disorders. Total hearing loss is a common feature of hearing disorders which are consequences of central nervous system damage. There is a greater likelihood of impairments in other functional areas being present (visual, motor kinesthetic). The situation is such that integrative hearing disorders may be of equal or greater concern to the neurological rather than to the otological specialist.

Frequency of types of hearing losses. Conductive hearing losses are the most frequently encountered hearing disorders and are especially prevalent among children. Sensori-neural losses are the next most frequently seen hearing disorders and tend to increase in frequency with age. By way of rounding out the discussion of types of hearing disorders, it should be pointed out that any disorder usually falls into several groups. For example, a conductive or a sensorineural loss may also be classified as "acquired" or as "congenital" (sensori-neural hearing loss, congenital; or conductive hearing loss, acquired). Conductive and sensori-neural losses may also be found in combination. A hearing loss may be the same for both ears (bilateral), but more often it is particular for the specified ear (unilateral). A type of hearing disorder which may be seen in certain situations is a special example of malingering and is designated as *functional* or *hysterical deafness*. Functional disorders are usually easily identified. They do not generally present significant treatment problems since they tend to clear spontaneously once the associated stress is removed.

Causes of Hearing Disorders

Normal hearing ability can be impaired by any defect or damage to the ear or auditory nerve. Sometimes the injury is grossly observable. In other cases, the locus of the damage is difficult to identify. As a rule, damage incurred early in development has more general consequences while damage experienced later in development tends to have consequences of a more limited nature. Conditions resulting in neural damage should be regarded as the more serious since they are likely to be permanent and irrepairable.

Anomalies. There are various possibilities for maldevelopment or failure in normal developmental processes of the ear. Absence of the pinna (auricle) is not of great importance for hearing although there may be minor ineffectiveness in localizing sounds. Blockage of the external canal (stenosis) or failure of the external canal to develop (atresia) is of more serious consequence for hearing and provides a basis for a conductive loss. Other anomalies are fusion of the ossicles

and ossification of ear membranes. Most of these conditions, which are predominantly congenital in origin, are amenable to correction by surgery with restoration of hearing.

Trauma. Included in this group of causes of hearing disorders is damage to the ear mechanism resulting from blows or prolonged noise. Trauma of this type are likely to be acquired from gun shot wounds, jet engine blasts, and high intensity factory noises. Conductive, sensori-neural, or integrative losses may result.

Inflammatory infections. Fungus, dermatitis, and irritations of the skin caused by bacteria may spread to the external ear, and accompanying swelling may block the external canal or produce force which upsets the normal pressure balance of the middle ear. The individual then experiences an acquired conductive hearing loss.

Obstructions and tumors. Abnormal growth masses of tissue situated in or near the ear can produce pressure, mechanical blockage or other damage and a consequent hearing disorder. Such neoplasms, or tumors, occur only rarely. Conductive type hearing losses also ensue from the placement of foreign objects in the external canal. Children can insert pellets or materials (beans, clay, etc.) which obstruct the external canal and interfere with normal hearing until removed. A common source of confusion pertains to the waxey substance, *cerumen* normally found in the external ear canal. Cerumen is manufactured by cells situated along the surface of the external ear canal and acts to pick up foreign materials entering the canal. It is also bacteriacidal. Contrary to popular belief, it seldom blocks the external canal. It tends to be exuded naturally, but at an individual rate. It should be left alone and not probed since efforts to remove it forcibly can lead to serious injury to the ear membrane.

Diseases. The action of infectious diseases probably accounts for most of the acquired hearing losses. Disease producing pathogens have access to the ear through the external canal, the eustachian tube, and the fluids of the inner ear which are extensions of the cerebrospinal fluid. Although the opening of the external canal suggests itself as the more readily available access, surprisingly little use seems to be made of this route, possibly because there are no known pathogens which have a specific affinity for tissues of the ear. Most infections reach the ear by way of the eustachian tube or the openings for circulation of fluid in the inner ear.

Damage to the ear mechanism may arise from the excess secretions which are typical of many diseases of the upper respiratory system. Otitis media, a condition frequently seen in children, entails the accumulation of such secretory fluids in the middle ear space. The eustachian tube is generally blocked by swelling and irritation of the infection. The normal pressure-fluid balance of the ear is upset by the excess fluids which cannot be drained by the blocked eustachian tube, and/or by the absorption of oxygen from the air trapped in the sealed ear space. Otitis media may be observed with

colds, measles, mumps, scarlet fever, diptheria, whooping cough, influenza, and other un-named viral upper respiratory diseases.

There may be a conductive type of hearing disorder when the passage is blocked by the accumulated fluids, or when the pressure balance immobilizes the action of the ossicles with membranes. Many effects of otitis media are temporary, but permanent damage may result when toxic products from the infection erode ear parts or the pressures build to a point that the tympanic membrane is punctured. Even when the excess fluids are largely drained off, a heavy residue can interfere with movement of ossicles and membranes if the accumulation reaches a sufficiently high level, as for example, by repeated middle ear infections.

Yet another source of damage to the ear parts is the outcome of pathogens that selectively appear to attack certain tissues or that produce toxins to which specific tissues are unusually susceptible. The nerve tissue seems particularly vunerable to this type of insult. This explains why a permanent sensori-neural type hearing loss often follows such illnesses as meningitis, rubella, encephalitis, and influenza. Other virus type upper respiratory infections which spread to the ear may also end in nerve damage and a sensori-neural type loss if the infection is severe or prolonged.

There are two important considerations applicable to evaluating the consequences of infectious diseases. Individuals show wide differences in capacity for resisting any disease. All tissues show patterns of greater or lesser degrees of susceptibility which are related to developmental stages. The consequences of rubella experienced in the first three months of development will thus be more extensive than when the same illness is incurred at age 30 years. From time to time, there are epidemic outbreaks of illnesses, usually of a virus pathogen, which produce a high percentage of auditory impairment among the thousands of children who have the illness. Congenital hearing losses, usually involving sensori-neural damage, are frequent outcomes of prenatal exposure to virus type infectious diseases.

Toxins. Tissues of the ear are subject to damage by contact with toxic substances just as are other tissues of the body. It is seldom that toxins are introduced by the ear, so this is not ordinarily an important source of damage resulting in hearing losses. Mention has been made of the toxic action of some pathogens. Some substances have been found to have specific ototoxic properties and to show an affinity for attaching and injuring ear tissues, especially the auditory nerve ending. Unfortunately this group of ototoxic agents includes some common antibiotics (neomycin, streptomycin, dihydro-streptomycin, etc.). Extreme caution must be exercised in prescribing antibiotics which are known to have ototoxic properties, particularly where the medication is to be continued over an extended time.

Allergies. The discovery that hearing losses can be produced by allergic reactions is relatively new. The importance of allergic reactions, which can have a wide range of consequences, is one of the

rapidly developing areas in the field of medicine. The ever increasing number of new substances in our surroundings, especially chemical materials, seems to have acted to increase proportionately the number of allergy reactions observed. Their idiosyncratic nature makes it very difficult to identify allergens. Hearing disorders produced by allergic reactions tend to be of the acquired conductive type and come and go with the degree of allergic reaction. A chronic allergic condition may eventually end in a permanent hearing loss, the result of damage to ear components, including the auditory nerve. Allergies can be expected to assume a greater significance in the management of hearing disorders as information about these presently poorly understood sensitivity responses increases.

Metabolic dysfunctions. Certain metabolic disturbances, particularly those prone to cause erosion of the bony matrix in which the middle and inner ear are imbedded, can terminate in hearing losses. There are degenerative changes with aging which can involve the ear. A hearing loss associated with aging processes is termed "presbycusis." Hearing losses induced by metabolic disorders are very rarely observed in children.

Treatment of Hearing Disorders

The availability of new medicines and the development of more precise techniques for surgical intervention have greatly increased the possibility for correcting hearing losses. Antibiotics have been highly effective in reducing the number and severity of ear infections. Perfection of the operating microscope, effective prosthesis materials, and the availability of a wide range of antibiotics have made almost routine those surgical operations that a few years ago would have never been possible. As a result, approximately half the hearing losses identified in children can be expected to be corrected in total or in part by medical or surgical treatment. Restoration of any part of a hearing loss can be of significant benefit to the person.

Modern medical treatment of a hearing disorder is often complex and entails the collaboration of several specialists. Routinely, an otologist, audiologist, and speech pathologist make up a minimal treatment team. Frequently, other specialists such as a neurologist, allergist, or psychologist are included in the treatment team. In a very real sense, treatment may in fact involve the coordination of services offered by the team of specialists. Certainly, it is essential that the otologist and audiologist work in close relationship since the important followup aspect of treatment must include routine assessment of the degree of hearing.

Diagnosis of hearing disorders. Treatment of a hearing disorder begins with an accurate diagnosis. The possibility that the factors causing a hearing disorder may continue to produce active damage to the ear makes it imperative that the causes be identified as quickly as possible. Some causes of hearing disorders, such as allergic reactions, are very difficult to discover. The diagnostic study must provide

a complete picture of the hearing loss, including the range of frequencies and the level of loudness for sounds heard by the person. The otologist relies on a case history, his examination of the patient, and a detailed measure of hearing ability (audiometric report).

Compiling an account of the onset and course of a hearing loss requires a painstaking review of past events and circumstances, even the hereditary background of the patient. Such information must be obtained from the parents of hearing impaired children and infants who are as yet unable to give reliable accounts of their experiences. Examination of the patient includes a careful inspection of the ear parts and associated structures. Tuning forks are frequently used in this clinical assessment, even though an exact record of the patient's hearing ability will be recorded on the audiogram. As a last step, information gained from the history and clinical examination is compared with the precise measure of hearing ability represented on the audiogram to arrive at a final diagnosis.

Although parents are becoming increasingly aware of what constitutes an infant's normal reactions to sound, these signs are generally only valid for suggesting severe degrees of hearing loss. Moderate and mild degrees of hearing loss, which may present better prospects for restoration, are much more difficult to detect on the basis of gross observation. Routine hearing screening for new born children is becoming more widespread, but is a service found only in selected larger metropolitan centers. The most common sign leading to identification of a hearing disorder is a speech problem. A speech impairment is a typical consequence of a hearing loss. Although an approach of waiting to see if the difficulty will be outgrown is commendable when dealing with many difficulties, it is advisable to regard any child who has a speech defect as possibly having a hearing disorder. The most serious consequences can come from a hearing loss which remains untreated.

Establishing an accurate diagnosis of a hearing disorder will usually require a series of examination sessions. Some hearing losses are of a variable nature and "come and go" with the severity of the underlying cause (as for example, in losses associated with otitis media infections). Routine follow-up examinations with periodic reassessment of the degree of hearing loss (audiogram) are necessary to assure the child getting maximum benefit from the treatment program. Skill and patience are needed to see that a proper hearing aid has been selected and that the child receives appropriate special training. Supportive reassurances must be given the child and the parent to keep the child striving. Hearing losses which are inherently of the "come and go" type can be especially difficult to identify. The child who fails the hearing screening at school may recover from an ear infection and evidence normal hearing by the time he is seen by an otologist. But the hearing loss will return with a recurrence of the infection. The inconsistency of these "on-again off-again" losses renders them difficult to identify and to treat.

Conductive losses. Prospects for favorable outcomes in response to medical and surgical treatment are greatest for the conductive hearing losses. A variety of antibiotics are available for combating ear infections which often localize in the middle ear. Caution must be taken to select an antiobiotic which is not ototoxic. Even though the ear is served by relatively few blood vessels making it sometimes difficult to raise antibiotics to the necessary concentration in the ear, the results of using antibiotics can be dramatic. Some persons seem prone to ear infections and have repeated infections. Over time, such chronic infections will produce erosion damage to ear structures, and a combination of medical and surgical procedures will be required for correction.

Formerly regarded as a kind of last hope, ear surgery has come to be an ordinary part of the treatment of hearing disorders. Antibiotics which reduce feared post-operative infections and refined equipment such as the operating microscope have made routine what were once only imaginative changes. Changes possible by surgery include removal of obstructions, reconstruction of malformations, repair of damaged parts, and substitution of nonfunctioning components. Sometimes there may be a choice of several procedures for achieving the same objective in correction. Decisions as to what type of medical or surgical course is to be followed are made by the physician who must accept responsibility for treatment outcomes. Here are brief descriptions of some of the common surgical procedures:

Removal of obstructive objects—the most simple example would be the taking out of an object (bean, seed, etc.) which has become lodged in the external meatus. In older persons, this may entail removal of accumulated wax, or rarely a small growth. Small tweezers, forceps, or irrigation with fluids may be used by the physician to remove these obstructions.

Myringotomy—surgical perforation of the tympanic membrane to permit drainage of fluids from the middle ear cavity. In some instances, a drain tube may be installed.

Myringoplasty—the repair of existing perforations of the tympanic membrane by grafting new tissue or by inducing scar tissue to close the small lesion on the membrane.

Tympanoplasty—a major procedure usually carried out under general anesthesia and sometimes requiring a series of operations wherein reconstruction of an entire new middle ear, membranes, ossicles, or a new opening in membranes is accomplished. The surgeon may use grafts and/or suitable synthetic devices (prostheses) as needed.

Fenestration—the creation of a new opening in the tympanic or the labyrinth membranes.

Clearing eustachian tube—the diameter of the eustachian tube may be enlarged by inserting and working a soft probe, by air injection, or by removal of obstructing tissues (adenoids or tonsils).

Stapes mobilization—a procedure which attempts to free the ossicles and to render them able to move, thus transmitting sound vibrations.

Stapedectomy—removal of a non-functioning stapes and substitution of prosthetic equivalent.

Modified radical mastoidectomy—entry of the middle ear by a passage cut through the surrounding boney structures in order to clean out the middle ear.

Radical mastoidectomy—this drastic procedure is generally undertaken in an effort to prevent a severe ear infection from spreading to the central nervous system. The middle ear is removed or destroyed in part or in total, with a hearing aid being fitted postoperatively to assume the lost functions.

Sensori-neural hearing losses—The optimistic expectation of a generally favorable response from treatment of conductive hearing disorders does not apply to the treatment of sensori-neural hearing losses. An injured nerve is not repairable by any known surgery or medicine. The eighth cranial nerve is specific for the sensation of hearing and no other nerves seem able to assume this function. Where the nerve has not been damaged but is only blocked as from pressure of a large tumor, surgical removal of the tumor may permit the nerve to resume normal transmission functions. The function of the eighth nerve may be impaired by an insufficient blood supply. In such instances, surgical intervention may bring an increased blood supply and a return to normal function ensues. Restorations of the eighth nerve functioning from blockage by tumors and circulatory insufficiency are rare phenomena. It is equally possible that the eighth nerve may be intentionally severed by surgery to obtain relief from intolerable sensations as in Meniere's disease.

Ear Hygiene

The ear is one of the most capable of self maintenance of all body organs. The cerumen (wax) performs a number of valuable protective functions and should not be removed by probing or digging. Cleaning of the ear should be limited to the pinna or flap of the outer ear. The external canal is self-cleaning. Where possible, the ear should be protected from situations of stress. Prolonged or sudden intense noise (ringing of bells, roaring of trains, shrieking of air blasts, jet engines, sirens) can damage the hearing mechanism. Another source of stress is found in sudden changes of pressure such as ascending or descending heights or diving (riding in a non-pressurized airplane, descending a mountain in a car, swimming, scuba diving). Forcible blowing of the nose, swallowing, chewing gum, wearing ear plugs, and pressurized chambers are some ways for minimizing the effects of stresses.

Summary

The ear is specialized for the reception (external ear), conduction (middle ear), and transmission (inner ear) of sound. Hearing

disorders arising from impairments in these functions are classed as conduction losses when the external or middle ear is involved and as sensori-neural losses when the inner ear is damaged. Most losses are of the conductive type. Hearing disorders are the concern of the otologist who works in cooperation with other specialists from audiology, speech pathology, and education to carry out a treatment program. Impaired speech is the most common consequence of a hearing disorder, especially for children. About half of the hearing disorders can be improved by medicine or surgery, especially where the intervention is made early in the disorder. The following generalizations reflect the important medical points of view regarding hearing disorders:

1. The degree of handicap is directly related to the amount of hearing loss (the greater the loss, the greater the handicap).
2. The earlier a hearing loss is incurred, the more general are the consequences.
3. The time initiated and the adequacy of treatment influences the positive effectiveness of treatment.
4. Conductive hearing disorders present good prospects for treatment.
5. Hearing disorders are often of mixed types.
6. Sensori-neural losses have the most obvious consequences for impaired speech acquisition.
7. The presence of other handicapping conditions in combination with a hearing disorder makes for a poorer prognosis regarding the hearing disorder.
8. Sensori-neural losses are only arrested and not restored by treatment procedures.
9. The correction of hearing disorders requires the cooperative efforts of several specialists (otologist, audiologist, educator, speech pathologist, and psychologist).

CHAPTER II. AUDIOLOGICAL ASSESSMENT OF HEARING DISORDERS

In this chapter, techniques for measuring the degree of hearing will be considered. The ear is a complex organ and subject to various defects which can interfere with the person's ability to deal with sound. A hearing loss is not visible, but must be established on the basis of measured hearing ability. Hearing losses vary greatly from one person to another even when the individuals have the same defect. Audiometry refers to the measurement of hearing. This is a specialized procedure which establishes how loud a sound must be in order to be heard (intensity) and what kinds of sounds are heard (pitch). To be effective, treatment or correction of a hearing loss must be planned for each individual. A picture of the hearing impairment is needed to complete the diagnostic study carried out by the otologist. A detailed assessment of hearing ability is essential as a basis for an effective rehabilitation-training program. Concern for correcting problems of the hearing impaired has resulted in a great increase in the number of audiologists, professionals having graduate and clinical training and specializing in the assessment of hearing.

Assessment of Hearing

The inability to see a hearing loss in the objective sense has made it necessary to develop techniques for establishing the existence of a hearing loss. Experience in attempting to measure hearing has documented the difficulties that are associated with efforts to quantify what are essentially qualitative phenomena. All instruments and procedures thus far developed for measuring hearing make an indirect assessment of the integrity of the auditory mechanism. This makes it imperative to use the most sophisticated instrumentation available and places the greatest demand upon the professional skill of the clinician who must interpret the significance of the measures obtained.

General objectives. At this time, evaluation of the auditory apparatus entails assessment of the nature of sound before it enters the ear. What is really assessed is the individual's responses to sound. Included are features of the sound, anatomic-physiologic-psychological properties of the person, and conditions of the situation in which the response is made. Responding to sound entails the interaction of all these factors. What may appear on first glance to be a simple reaction to a single stimulus, then, is actually a complicated series of adjustments made to complex stimuli. Audiometric assessment must account for all of these relevant variables that are involved in hearing. The accounting must provide a consistent picture for the individual, be communicable to other professionals, and be presented in terms that are meaningful for hearing ability.

Assessment of hearing controls such external features as the degree and type of sound present and the nature of the situation in which the assessment is carried out. Variations in the individual's responses to sound are studied closely in these controlled conditions.

The focus is on the individual who is considered from historical, behavioral and test response perspectives. Genetic background, general development, physical health, and speech and language acquisition are important areas for historical exploration. Observation of the child's reaction to sounds, especially speech, may provide clues to areas for detailed investigation in the formal testing session. Certainly, these gross reactions to sound form a base of behavior which should be predictable by the pattern of test responses to sound. The person's speech may be the most important behavior for close observation. Recording of responses to sounds with fixed degrees of loudness and frequency is the core of audiometric assessment. Testing can be carried out using relatively simple or complicated instruments. The validity of a hearing assessment is generally directly related to the amount of time given to testing and to the degree of sophistication of the instrumentation. However, the skill and experience of the examiner may be the single most important determinant of validity.

Even though most audiological assessments are made by professionals who are not trained as physicians, medical consultation is essential for interpreting the results of hearing tests. A hearing loss is generally a consequence of a defective auditory mechanism, but subnormal hearing can be found in association with mental retardation, central nervous system impairment, and emotional disorders. Differentiation of the truly hearing impaired individual from the subpar functioning sometimes observed in connection with other conditions can usually be made on the basis of this syndrome:

1. There is a consistently demonstrable inability to deal with particular types of sounds.
2. Measures of other areas of functioning (visual, motor, intellectual, emotional) are within normal limits.
3. Speech is impaired.
4. There is a dependency on visual and manual process for communication.

Examples of Hearing Tests

There are a number of tests which can be used to measure hearing. At one period of time, any one test may have represented the level of prevailing technological development and might have been entirely adequate for the treatment and corrective procedures available. The continued use of many of these tests suggests that they are still adequate for certain purposes, for example, as a gross screening technique. The presence of these tests also implies that the skill of the examiner in interpreting the data may be more important than the type of measure obtained. For some situations, a gross evaluation of hearing is entirely sufficient, in other instances, the most detailed analysis of hearing ability is demanded.

Watch-tick and coin-click test. In these tests, the distance from the ear to the point at which the person can no longer hear the ticking

sound of a watch is recorded in inches. The person is asked to report whether a coin dropped on a hard surface has a sharp ringing sound (high frequency) or a dull thud (low frequency). Even though variations in the construction of watches and coins have influenced the stability of these sounds, they may have a useful purpose for the general medical practitioner.

Hearing voice test. Standing at a distance 20 feet removed, the examiner requests the person tested to indicate if a "loud," "normal," or "whispered" voice is heard. Even though it is recognized that voice intensity levels equal to "loud," "normal" or "whispered" are difficult to control, this is a well intended test which seeks to ascertain critical use of hearing in dealing with speech. It can be helpful as a gross screening index.

Conditioning tests. Several variations of this procedure are in use. The instruments allow for the person tested to be trained to make a response to sound. This may be a startle response, fear, or pushing a button to receive a piece of candy. The instruments are useful in work with persons of limited response potentials, for example, infants who have no language. They can serve in gross screening assessments, but they have an unfortunate tendency to evoke a high degree of anxiety which limits the number of times they can be given an individual.

Tuning fork tests. In these tests, the person's reactions to sounds delivered by tuning forks are observed. A tuning fork is an instrument designed to deliver a sound of fixed frequency when struck (256, 512, 1024, 2048, 4096, etc., cycles per second). Held in the hand, sound is delivered by usual air conduction routes. Placed in contact with the head, the sound generated by the fork travels by bone conduction. The intensity of the sound can be approximated by the length of time the person is able to hear it after the fork has been struck. Assessment of hearing with tuning forks is a favored method used by otologists. Quickly and easily given, and having quantitative and qualitative features, the experienced otologist can use these tests to compile a precise evaluation of the auditory mechanism.

Rinne test. A quantitative test in which the length of time a vibrating tuning fork placed on the mastoid process (bone conduction) can be heard is compared with the length of time the fork can be heard when placed at the opening of the external canal (air conduction). Hearing for air conduction will normally exceed that for bone conduction.

Weber test. A qualitative measure obtained when a vibrating tuning fork is placed on the top center of the head. The sound is heard best by the non-affected ear if deafness is due to defect of the auditory apparatus. In contrast, the sound is heard best by the affected ear when deafness is caused by obstruction of the air passages.

Pure tone audiometer. The audiometer is a system of electronically balanced components which allows the operator to deliver tones of fixed frequency and intensity to the person being tested. Sounds may be delivered through ear phones to one or both ears, or by means of a bone attachment to the mastoid area. Controls are such that precision is possible in the delivery of a wide range of single fixed-frequency sounds, successive sounds at a fixed level (recruitment), and introduction of competing sounds (masking). The complete range of possibilities for hearing can be evaluated including air, bone, and sensori-neural functions and from qualitative and quantitative aspects.

Speech audiometer. The speech audiometer provides the same refined controls for speech rather than (or in addition to) the pure tones of the pure tone audiometer. Responses to the speech sounds can be assessed with the same precision, and the same functional operations are investigated. In some instances, other recording devices such as an electroencephalogram, may be used to supplement the assessment. Assessments made with audiometers must be carried out by a trained audiologist and require lengthy sessions. The results probably provide the most valid and complete picture of the individual's responses to sound.

AUDIOMETRY

Advances in the field of electrical technology and the increased concern for providing rehabilitation services to persons who had hearing losses were significant factors influencing the development of current audiometric procedures and practice. While audiologists were initially able to verify only the more severe kinds of hearing losses and were largely limited to working with adults, they now provide highly technical information relevant to all age groups and to all types of hearing disorders. Today, the skilled audiologist may locate the existence of a tumor having vital consequences for the individual or identify a significant hearing loss in a child yet in utero.

Audiometric measuring units. The assessment of hearing examines the person's responses to sound along two dimensions, intensity and frequency. The units in which these attributes are measured are controlled by the International Standards Organization and are standardized the world over. Frequency, or the pitch of sound, is recorded in number of waves or cycles per second (cps). In many countries, including the United States, cycles per second is also designated as "hertz." Low pitch sounds are those having a low frequency, such as the bass notes of a musical instrument. High frequency sounds, such as those made by whistles, have a high cps. The hertz range included on most audiometers is 125 through 8000. Assessment is ordinarily made at 125, 250, 500, 1000, 2000, 4000 and 8000 cps points.

Intensity, the relative loudness-softness of sound, is expressed in a force unit called a decibel and is abbreviated as *db.* (In the United States, the abbreviation dB may be encountered.) The level of in-

tensity at which most persons would hear a sound is designated 0 db, and the range of intensities available on most audiometers is 0 to 110 db. It is of importance to note that the arrangement of the scales for measuring frequency (cps) and intensity (db) is logarithmic. This means that the distances suggested by points on the scale are not equivalent as they would be for a strictly linear scale. Although the difference between 10 db and 20 db appears the same as for that between 40 and 50 db (10 db), the intensity of the tone from 40 to 50 db is a hundred times that of the tone from 10 to 20 db. This fact has compelling implications for aspects of a corrective program.

Audiometric procedure. The effectiveness of the audiometer is influenced by conditions prevailing in the testing situation. Two adjacent rooms with a common glass viewing panel provide a basic testing arrangement. The testing rooms should be sound proof, comfortably ventilated, and well lighted. This combination is not easily arranged since most ventilating systems are particularly notorious for having associated noises. The audiometer is a tool and as such it must be kept in first class working condition and used with skill. The many components of the audiometer must operate in harmony with each other. When one part does not mesh with another part, the instrument is said to be out of calibration. The settings for intensity and pitch will be distorted and an invalid assessment of hearing will ensue unless the instrument is periodically calibrated. The audiologist is responsible for keeping the instruments used in first rate operational condition and for seeing that physical features of the testing rooms are suitable.

At the start of the testing, the person is given an explanation of what is to happen and shown the test rooms. The person being tested should feel relaxed and comfortable and must be willing and able to cooperate by making the requested response, usually by raising the hand, when a sound is heard. Sounds at the customary frequency intervals (250, 500, 1000 cps) are delivered initially to the individual tested. The first sounds given are loud enough to make certain that the person will be successful in hearing, as well as to facilitate the person's learning *how* to respond. Such training will speed subsequent testing in which sounds that are very loud and then drop to lower intensities alternate with sounds initially very soft and then build up to very loud levels.

Testing begins with checking the person's ability to hear pure tones by the air conduction route. If hearing for both ears is in the normal ranges for these frequencies and intensities, there is no reason to continue the testing. When the person is unable to hear sounds in the normal ranges of intensity, a detailed analysis of hearing ability is carried out. The audiologist may next compare responses to sound delivered by bone with responses to sound delivered by air conduction routes. Responses to speech may then be recorded. Finally, the audiologist may wish to carry out a number of specialized tests more directly related to nerve functioning than to hearing.

The audiologist is guided by some generalizations in making the hearing assessment. These include:

1. Air conduction is slightly superior to bone conduction.
2. In a conductive loss, bone reception is better than air reception.
3. Conduction losses are greater for low frequency sounds.
4. Sensori-neural losses are greater for high frequency sounds.
5. Air and bone reception are equal in a sensori-neural loss.

The audiologist may wish to make several follow-up evaluations to verify uncertain or ambiguous information. Difficulty is routinely experienced in maintaining precise control over sound delivered by bone conduction routes, especially when the intensity is greater than 60 db. The audiologist obtains a quantitative evaluation of hearing which is highly useful to all correction and rehabilitation efforts. The evaluation can be used to estimate the degree of benefit expected from surgery and the advisability of undertaking surgery, and to differentiate a sensory from a neural loss, even though such a distinction is often of little value. The evaluation also establishes a base for comparing other measures of hearing to be made after treatment or rehabilitation efforts.

Special problems in the audiometric assessment of children. It is increasingly recognized that the most important place to initiate a treatment program for correcting a hearing loss is with the young child. Unfortunately, most of the equipment such as the audiometer and even hearing aids were developed originally for work with adults. Even when all his functional systems are intact, the child is very limited in what he can do as compared to the adult. Here are some of the problems encountered in assessing children:

1. The child is more uncertain about whether he did or did not hear a sound, see a light, feel a tug, etc.
2. The child is unfamiliar with how to operate much of the commonly used testing components (ear phones, buttons, etc.).
3. The child has limited communication ability.
4. The child may fear the strangeness of the testing situation (examiner, equipment, absence of mother).
5. The child is able to work at a task only for a very brief period of time.

Despite the existence of this rather formidable set of barriers, the audiologist must overcome or circumvent these obstacles. There are increasing requests for neonatal hearing assessment, and many indications point to routine hearing checks as a part of preschool programs. Testing of the new born entails recording reactions to sounds of gross intensities (90 to 100 db). The limited response possibilities of the neonate dictate that comparable gross reactions such as the startle response or general motor activity are to be observed. These responses must be paired to the sound stimulus, so that a "conditioning" session may precede the actual testing.

By age three months, the infant is able to make responses which

reveal the beginnings of discriminatory refinement. Ability to differentiate sounds will progressively increase with age and by six months the infant will move his head to search out and to localize different sounds. From about that age on, assessment becomes more a matter of the resourcefulness of the audiologist in finding a response which the child can use in reacting to sounds.

Audiologists work in pairs to assess a child's hearing. While one member of the team goes into the testing room alone with the child, the other remains in the adjoining room to observe, record and put selected sounds into the testing room which holds the child. The child must be shown how to recognize the sound stimulus and how to respond to it. This may take practice sessions. The audiologist working with the child must communicate with the child in ways the child understands. The examining audiologist may have to get down on the floor and engage in play with the child to gain the child's confidence and to get the child to cooperate.

Play can be a useful way of providing information about the child's reactions to sound. Many toys make some kind of noise, and the child's interest in the toy centers about the noise it makes. Noise-maker toys may be purchased in pairs and the noise-making element removed from one of the pair. The child is first given the noise-making toy. The noise-making toy is then surreptiously replaced by one with the noise-maker removed, and the child's reaction observed.

Conditioning techniques, where the child is trained to make a selected response to sounds, are widely used in the assessment of children. Sometimes this entails presenting a favored toy or an appealing flashing colored light with the test sound. Some children respond positively to pushing a button in response to test sounds and are rewarded with a tidbit or small piece of candy. Other techniques are more complicated and make use of additional instrumentation which is used to measure non-visible reactions to hearing. Changes in the electrical conductivity of the skin (psychogalvanometer) or the electrical activity of brain cells (electroencephalogram) associated with hearing are two possibilities. The child is presented with sounds that include pure tones, environmental sounds, speech, noises, and mixtures of these. Even under the best of circumstances, errors in the assessment of children's hearing can be large ($\pm$20 dbs).

The completeness of the assessment of hearing depends upon the degree to which the child is able to respond to the sounds presented. If the child is cooperative, a precise analysis of his hearing can be obtained. It is not necessary, however, to have a precise or a complete assessment of hearing ability in order to initiate a treatment program. Knowing the general range of the loss is adequate for proceeding with amplification and with special training in language acquisition. Most important, even a doubtful assessment of hearing gives a base against which future assessments can be compared. Future assessments can establish the stability or progression of the hearing loss. Follow-up assessments of hearing should be routinely provided

as an integral part of the treatment program given any child with a hearing loss.

AUDIOGRAM

The results of the hearing assessment are recorded on a form which shows standardized information even though the arrangement of the information may vary slightly from one agency to another. The two dimensions of sound used in the assessment of hearing are plotted

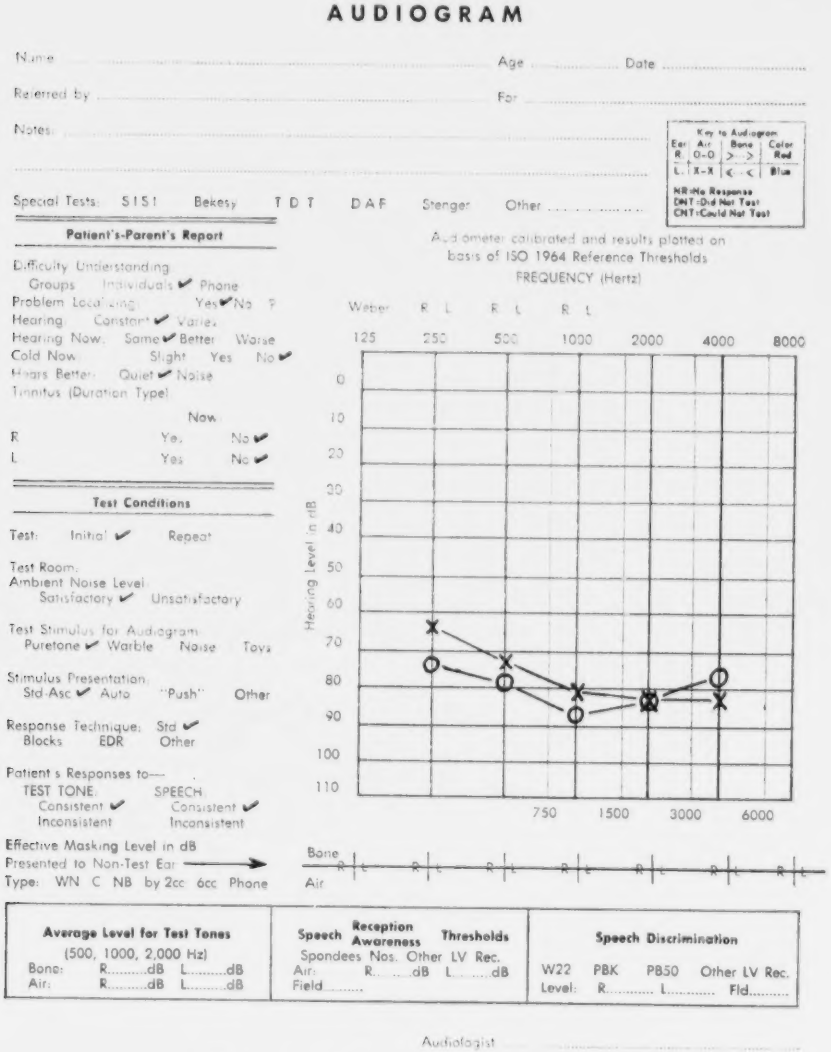

Figure 2. Sample Audiogram Record.

in detail. Frequency (pitch) is shown along the abscissa of the graph. Intensity (loudness) is plotted along the ordinate of the graph. The person's hearing level for each of the frequencies tested is marked on the audiogram. Results for air and bone conduction and for each ear are shown separately.

As noted on the explanatory key, the record of the right ear is marked in red color while the record for the left ear is given in blue color. The intensity level at which the person hears a sound frequency (threshold) is shown for each of the frequencies. Air and bone conduction routes are recorded for each ear. The symbol "O" designates the threshold for the right ear and "X" is used to mark thresholds for the left ear. Threshold is the minimum level of stimulus intensity required for the person to make a response in whatever sensory modality is being measured. A stimulus below the individual's threshold will not elicit a response. Threshold points for air conduction responses of the right (O) and left ear (X) are connected by a solid red or a solid blue line, respectively. Bone conduction thresholds may be shown by $< >$ or [ ] bracketing symbols for the right and the left ear. The key will indicate which of the symbols marks the bone conduction threshold for the right and which for the left ear. Air conduction threshold points are connected but bone conduction threshold points are not joined by a line. The symbols "△" and "□" may be used to designate responses obtained with the use of masking noises. There is no universal agreement regarding the use of all symbols, but each audiogram form has an explanatory key. The greater portion of the audiogram may be given to recording responses to pure tones, but other sections will show responses to speech sounds, masking, and various tolerance and efficiency levels.

Information concerning the capacity for handling speech is essential for educational planning. The critical frequencies for ascertaining ability to hear speech sounds are 500, 1000, and 2000 cps. Losses in the 500 cps segment (conductive type losses) are reflected in difficulty in hearing many of the vowel sounds. A loss (commonly a sensori-neural type) in the 1000 to 2000 cps range is accompanied by an inability to hear the "voiceless" consonants (p, k, s, t, f, sh, ch, and th). The assessment of speech reception entails making a number of specific tests and computing relevant threshold levels. Some of these include:

Ambient noise—noises commonly present in any situation which may interfere with sounds of similar intensity or frequency such as noises from traffic, blowers, or people walking or talking.

Masking noise—noise purposely introduced during audiometric testing to compete with the test sound stimulus, replicating ambient noise conditions.

Discrimination—(or articulation) ability to differentiate sounds that are very similar (lake-like, tight-fight, etc.).

Lateralization—a test made to ascertain the ear to which a sound

made by a vibrating tuning fork placed on the midline of the skull will be referred.

Dynamic range—difference between threshold and tolerance level. When this range is short, amplification may be difficult to apply.

Speech reception threshold (SRT)—minimum level of intensity at which the person can understand simple running (connected) speech.

Most comfortable loudness (MCL)—intensity level which is most comfortable for receiving running speech.

Tolerance level (TD or UCL)—intensity level at which speech is perceived as uncomfortably loud. This indicates the maximum degree of amplification for a hearing aid fitted to that person.

Phonetically balanced (PB)—these are particular tests for speech sound discrimination and present selected monosyllabic words which the person is to identify.

Social adequacy index (SAI)—a measure computed from results of discrimination and speech-reception thresholds and representing the degree of handicap experienced in hearing and understanding speech.

White noise—a composite of many frequencies combined into a single band of noise which is introduced at various intensity levels for masking.

Interpretation of the results from these tests demands much skill, consultation with other professional persons, support from other data, and re-evaluations. Interpretation must be left to the trained audiologist. The detailed analysis of the individual's capacity to deal with sound, focusing on speech reception, comparing air with bone conduction, and noting the relative efficiency of each ear, is the pivotal point from which the physician makes a diagnosis of hearing disorder, and from which the educator plans a rehabilitative training program.

Classification of Hearing Losses

Mention has been made of several systems for grouping hearing difficulties. A classification scheme can be based on several sets of characteristics. This possibility is substantiated by the existence of more than one classification scheme for almost any condition. Hearing disorders can be regarded as acquired or congenital, as conductive or sensori-neural, as chronic or acute, and so on. Each classification has associated implications and suggestions for correction or treatment. Yet another classification scheme is based on the amount of hearing loss as suggested by the audiometric responses to sound.

A classification according to the severity of measured hearing loss has extensive implications for rehabilitative training. Actual planning must consider whether the loss is congenital or acquired, unilateral or bilateral. Stability, and possibilities for surgical correction are aspects of the hearing loss that must also be considered. There is overlap among the groupings and any given person with a

CLASSIFICATION ACCORDING TO SEVERITY OF HEARING LOSS

Intensity levels in db units	Qualitative Grouping	Speech Implications
0 to 25 db	Normal	"Normal" difficulties
26 to 40 db	Slight loss	Delayed acquisition, but essentially normal
41 to 50 db	Mild loss (Hard of Hearing)	Mild articulatory speech problems, difficulty hearing in noisy conditions
51 to 75 db	Moderate loss (Hard of Hearing)	Marked articulatory speech problems, difficulty controlling voice intensity
76 to 90 db	Severe loss (Deaf)	Lack of oral language, voice quality flat and monotonous
91 to 110 db	Profound loss (Deaf)	Lack of oral language. Voice quality harsh with jerky variations in intensity

mild loss may pose habilitative problems far more challenging than those posed by one with a profound loss. The classification probably has the most consistent implications for the fitting of a hearing aid, a procedure which relies heavily on the analysis of hearing represented on the audiogram.

The normal speech reception threshold is about 40 db and conversational speech intensity is approximately 75 db. An individual with a loss greater than 40 db is going to miss hearing some speech. The greater the loss, the more speech is missed. These points, 40 db and 75 db, are critical for speech reception and mark the ranges for yet another classification, the hard of hearing and the deaf. The hard of hearing child will experience delay in acquiring speech, tends to have a meager vocabulary, omits many sounds, and substitutes others. This general pattern is proportional to the degree of hearing loss. Speech becomes more faulty with higher degrees of hearing loss. As the loss becomes so severe that all speech sounds are lost in unamplified conditions, the quality of the voice is influenced. The most obvious indication that the child is not hearing any speech may be observed in his own voice quality. Even after considerable specialized training, the voice of the congenitally deaf child has a distinct mechanistic quality. It is flat, monotonous, and devoid of nuances of expression. Level of intensity and rate of expression are varied and jerky adding to a generally unpleasant vocal quality. The person is unable to hear his own voice sounds and cannot carry out the refinement of voice quality which comes only from extended monitoring of his vocal output.

Audiogram Profiles of Hearing Impairments

Even for persons whose hearing ability is within the normal ranges, there are variations in the hearing acuity for the various frequencies, conduction routes, or right and left ear. A "flat line" pattern of thresholds indicating uniform responses to all sounds has become more of a rarity with refinements in audiometric assessment equipment. There are generalizations which can be drawn from the variations in ability to cope with sounds, particularly speech, as shown in the audiogram. These patterns have been classified, and what the person can hear and what he cannot hear is the basis for educational programs, arranging amplification, or establishing communication with the individual.

Conductive impairment. The most obvious characteristic of the audiogram in this loss in the disparity between air and bone conductive routes. Bone conduction thresholds will be at or near normal. In contrast, air conduction thresholds will be below normal, often in the moderate loss range. Air conduction thresholds will tend to be lower with greater hearing loss for low pitched sounds, while the thresholds will raise (and hearing improve) for high pitched sounds (4000 cps and higher).

Sensori-neural impairment. The pattern of responses for sensori-neural losses is somewhat the reverse of that seen in conductive losses. Thresholds for air and for bone conduction will be about the same, often equivalent. Thresholds may be at or near normal for low frequency sounds, but hearing acuity drops rapidly, usually to the severe or profound loss level, for the higher frequencies (500 cps and higher).

Mixed impairment. The audiogram obtained from an individual who has both a conductive and a sensori-neural impairment shows a pattern of some loss by bone, but greater loss by air conduction. Response levels may be rather stable for low frequency sounds, but drop rapidly for 1000 cps and higher frequency sounds. Although not regarded as a type of hearing loss in the sense of having associated particular characteristics, differences in the hearing acuity of the right and left ear can be considerable. A loss in the functioning of only one ear is referred as a unilateral loss. When the loss is measurable in both ears, it is termed bilateral. Examples of the use of these classifications are "Bilateral conductive impairment, moderate," or "Unilateral sensori-neural impairment, severe," or "Bilateral mixed impairment, mild to severe."

Familiarization Training In Use of Amplification

Improvements in the fidelity, bulkiness, and durability of hearing aids have made them suitable for pick-up of a wider range of sounds and for wearing by small children. Most persons who have a hearing loss will be given a trial at using amplification, and at least some benefit can be expected. The importance of having an aid that has been

prescribed on the basis of a competent assessment of the child's hearing apparatus cannot be overemphasized. To be effective, a hearing aid must be designed for the individual just as corrective eye lenses are prepared for a particular person. A castoff hearing aid discarded by "Uncle Joe" is not likely to be anything but trouble if given to a young hearing impaired child.

Parental preparation. The more an aid can be made a normal part of daily living activities, the more benefit is likely to be gained by the wearer. First experiences with the aid, as is true for any new experience, tend to make lasting impressions. Starting with a properly prescribed aid and beginning training as soon as the hearing loss has been identified are steps most likely to result in initial success. It is unjustified to believe that once the child dons the aid, he will immediately have full functional use of his hearing. He may never regain complete use of lost hearing, but with training and practice, there can be significant benefit.

Since children rely on parents for clues as to how to react to new experiences, the parent should deal with the child's first contacts with the aid in a confident and assuring manner. The parent can insure these attitudes by availing himself of pretraining sessions. This will include an understanding of what the aid does, how it is to be worn, how to assemble it correctly, and how to make minor on-the-spot repairs. The aid must be kept out of water. Extra batteries and carrying cases are advisable. It is recommended that the parents observe and practice as the audiologist or other trained technician sets up and operates the aid before carrying out the first sessions with the child. In some cases, initial training with the aid may be done at school or in a clinic by a professional worker. The parent should observe this procedure so as to be able to continue uninterruptedly the training in the home as this step is reached. As the child grows, parts of the aid will have to be readjusted to fit the child.

The first training session. At some future time, a child who has a hearing loss may be born with a hearing aid. For now, a period of gradual introduction to the new sounds brought by the hearing aid is necessary for all children. Patience, confidence, and close observation are required to avoid overwhelming and traumatizing the child. It is preferable to have a definite time for using the aid, preferably an early morning time so that adjustment to the aid can be included in the child's routine processes of adjusting to his surroundings. Wearing the aid must begin under the firm control of the parent. It would be a costly error to have the child regard the aid as some kind of toy to be played with according to his moods. The child may wear the aid only for a brief period at first. It is, in fact, preferable to remove the aid before the child has a chance to get tired of it. A leather harness to hold the aid securely is recommended for children who are then free to engage in normally active and boisterous play.

A quiet room is the ideal setting for the child's first experience with using the aid. Learning to absorb the punch of loud noises as

generated by congested street traffic or crowds of people comes later. Use a normal tone of voice in talking to the child. Caution newcomers to speak distinctly rather than loudly to the child. The volume adjustment for the aid should be set at or slightly below the optimal level as indicated on the prescription for the aid. Beginning with a loud volume may startle the child and create apprehension which will be difficult to overcome. Be on the alert for signs of distress and remove the aid before this builds up. Tolerances for aids vary with individuals. More important than expecting the child to wear the aid for a particular amount of time is a pattern of comfortable daily use with the period of wearing being a little longer each day.

Consistent with the "go slow" approach, it is preferable to use the common sounds available in the familiar confines of the house as the initial learning experiences for the child. Footsteps, opening and closing doors, telephones, washing machines, sweepers, water running from a tap, any one of these is sufficient for a daily lesson and review. Closely following training in sound awareness and identification is training in localization. All of these skills can be developed by carefully managing games that children normally engage in. Have the child close his eyes and make a sound from one of a group of objects (bell, rattle, horn, drum, etc.). The child then opens his eyes and indicates which object made the sound and from what direction the sound came. A variation is to have different people in the room call his name, and the child tries to identify the person. A more difficult game has the child locate a toy hidden at the spot where it was sounded while his eyes were closed. The parent should remember to structure such games so that the child will have initial successes. During these times, the child can be instructed in the care and operation of the aid, especially volume control.

Follow-up training sessions. Once the child demonstrates ability to use the aid successfully in the home, then the training ground should be systematically extended to encompass the larger community. Going out in the yard, taking a walk along the street, a trip to the super market, a visit to the zoo, attending a movie, and witnessing a ball game are some of the many new occasions for continuing lessons. Use of the volume control to render sound levels tolerable is an important aspect of this phase of the training. The parent should be alert for indications that things are not going well and should be prepared to halt operations until needed technical advice on what to do to resolve the difficulty is obtained from the teacher or audiologist. As a final aspect of training, another family member, friend or relative should be brought into the training program. The child should be encouraged to make trips in the company of the new adult in the place of the parent. Independent use of the hearing aid is a gradual process of achieving these steps; learning to use the aid to identify sounds, learning to localize and associate sounds, learning to operate the aid to adjust for various conditions, and finally learning to feel comfortable wearing the aid all the time.

Summary

Management of a hearing disorder may involve medical treatment, surgical correction, amplification, special training, and counseling. Success in invoking any of these procedures depends upon a detailed analysis of the individual's ability to cope with sounds. Capacity for dealing with speech is especially crucial since the practical consequence of a hearing loss is impaired communicative facility. Although hearing losses can be assessed in several ways, such as the tuning fork tests used by otologists, the audiologist is increasingly recognized as the specialist most qualified for obtaining a precise picture of hearing ability. The audiologist relies extensively on his skill in using the audiometer, a sophisticated electrically operated instrument for measuring responses to pure tones and to speech. The audiogram is an invaluable guide which tells just how the person is handicapped in communication, presenting a picture of the degree of loss and the sounds that are not heard. From this information, plans can be formulated for strengthening areas where residual usable hearing remains and compensatory training programs can be initiated. The contribution of audiological assessment can be summarized:

1. Measurement of hearing loss requires a skilled audiologist.
2. The audiologist is responsible for the accuracy and for the interpretation of the instruments he uses.
3. The audiologist works closely with the otologist and the teacher.
4. Impaired speech is a consequence of loss of hearing sensitivity.
5. A hearing loss must be differentiated from problems found in mental retardation, neurological impairment, and socio-emotional maladjustment.
6. Assessing the hearing of children makes crucial demands on the audiologist's resourcefulness.
7. Classifications of "hard of hearing" and "deaf" have many useful practical connotations.

CHAPTER III. CASE WORK SERVICES FOR THE HEARING IMPAIRED

The desirability of close cooperation between the home and the school has long been recognized. "Getting an education" has become an increasingly complex matter necessitating the integration of a tightly articulated sequence of instructional and supportive services. As a consequence, the pupil is subjected to many more demands and must cope with a formidable set of expectations. When things do not go well, the pressures impinging on a pupil can quickly mount to a level where emotional disorganization further reduces functional effectiveness. The advent of the social worker in the schools is an indication of the complexities involved in supplying the most appropriate educational program for each pupil. The social worker acts as a liaison agent through building and maintaining communication between school staff personnel (teacher, counselor, psychologist, nurse, administrators), family and parents, and community located specialists (physicians, audiologists, recreation worker, mental health worker). The social worker continually gauges the level of emotional stress on the pupil and acts to prevent such stress from impairing the level of functional effectiveness. Working with the teacher, parents, and the child, the social worker is concerned that every available asset be fully utilized so as to permit the child to function effectively when an adult.

Case Work Services

Case work services grew out of efforts to coordinate the array of services available in the community with the strengths represented by the home and family. The movement recognized that the home and family held forces for *generating* adjustment difficulties, as well as rich resources for *correcting* adjustment difficulties. Initially, social workers dealt largely with persons who were severely incapacitated. Gradually, however, social workers have become more involved in the promotion of normal social development as a way of preventing severe maladjustment. The traditionally close relationship between the school and the home invited the addition of professional case workers to the school staff. Active involvement of the school in the prevention of maladjustment demanded case work services.

Case work services in the school are also referred to as "social work services," and as "school social work services." The terms reflect the fact that these services are provided by a social worker who is especially prepared for work in the schools ("school social worker"). Case work service represents a skilled method for working with the social factors that influence an individual before and after a difficulty arises. School social work service seeks to help the individual child who encounters a barrier that prevents his making the most of what the school has to offer. Through a working relationship established between the teacher, the family, and the child, an oppor-

tunity is created for sharing information and for cooperative planning for the child. The child benefits from the ensuing understanding of his difficulty and from the mutual efforts to assist him. Social work services seek to facilitate the child's ability to profit from an educational program by examining and improving the interactions between the child and his surroundings.

Preparation of the Case Worker for Work with Hearing Impaired. The traditional emphasis upon coordination and cooperation is evident in the school social worker's preference for working as a member of a professional team. The training of the social worker emphasizes the acquisition of skill in dealing with the dynamic contribution of emotions and with the consequences of failure and frustration to human behavior. Preparation includes an awareness of the physical and the emotional components of impairment. Knowledge of available community resources and the procedures for helping children and families obtain these resources is of practical necessity.

An acknowledged liking for children is not a sufficient basis to enable the social worker to function effectively in the schools. Professionals from all areas are increasingly aware that adult assessment techniques, concepts of pathology, and intervention strategies cannot be unqualifiedly extended to children. A thorough grounding in processes and principles of child growth and development is essential for providing services to children. In addition, the caseworker must be knowledgeable in all aspects of hearing defects. Causes and kinds of impairments, the roles of the various specialists who deal with hearing impairments, possibilities for correction, and educational and rehabilitative outcomes are topics for parents' first questions. Next in importance are concerns about community facilities offering services to the hearing impaired child (otologists, speech and hearing centers, audiologists, special schools, hearing aid repairmen).

When assigned to work with the hearing impaired, the caseworker may give a large portion of her work day to observation of community facilities and to consultation with the professional staff. Since the child will spend most of his time in the school, the caseworker must be especially familiar with the school program. One of the most important aspects of special training is the necessity for the caseworker to become skilled in the operation and maintenance of the hearing aid. It is suggested that the caseworker attend sessions dealing with the use of hearing aids to gain a full understanding of the nuances of regulating volume control, pick-up range, wearing the aid comfortably, replacement of power supply, and when the aid must be returned for technical repair.

Delivery of Services

Providing casework services for hearing impaired children is an additional measure that enables the child to gain maximum realization of his potential for adjustment. Experiences in the first two years of life, an age period which is not usually included in even the

most advanced early school programs, can be especially critical for the hearing impaired child. Preschool programs in which children are entered into a program at an age earlier than the customary school entrance age are as yet few in number. Even when well trained in the special educational methodology of the hearing impaired, teachers are not usually familiar with the growth and developmental patterns of the preschool age child.

Evidence as to the crucial role of initial experiences in contributing to development gives potent support to the move to extend the educational program into the home. The most important people in the child's life are those in his home. These are the persons who arrange his environment, first make expectations of him, and first provide rewards for his responses. The child first learns in his home and his parents are his first teachers. The child's first social adjustment is made in the home. It follows that the child learns naturally in his own home and from his own parents. The social worker should function so as to enhance this early learning.

Coordination and Integration Functions

Our world is a vast social organization made up of groups of persons having varied beliefs, customs, values, and languages. There is a comparably wide range of jobs, services, facilities, roles, and rewards. Socialization involves putting together an arrangement of some of all these aspects into a pattern that is acceptable to the individual and to society. The social worker is concerned with applying professional skills to clarify, resolve, or integrate the processes of socialization. Where his professional services are not sufficient for assisting the individual, the social worker turns to his familiarity with other community services and quickly mobilizes these to make them available to the individual. This procedure should favor a smooth continuation of the socialization processes.

In providing services to the hearing impaired child, the social worker seeks to create a working relationship in which there is maximum communication. Discussion of feelings, sharing of ideas, debating of alternatives, and evaluation of information in a situation where there is mutual respect and consideration for all persons is essential for laying out plans for the effective socialization of the child. This type of communication and planning can most readily occur when the atmosphere is friendly, inviting, and reassuring. Participants must feel free to express all their ideas, even those that may prove inaccurate or be unpopular. Careful and cooperative sifting of plans and ideas must be followed since each outcome is unique. Even though no single recipe can be proposed that will prove universally satisfactory for all problems, there are some common areas of concern. These areas of concern include:

1. An accurate orientation to the consequences, limitations, and prognosis for hearing impairments.

2. An interpretation and explanation of technical terminology.
3. A review of treatment methods and objectives, including educational outcomes.
4. An approach cast in a child development matrix.

It is not possible for any one individual to do a competent job of rearing a hearing impaired child. Medical, audiological, educational, and mental health services must be integrated into the child's pattern of family and community living. The social worker establishes contacts with all services in the community, but maintains the closest relationships with the teacher and the parents as the primary sources for managing the continuity and consistency needed for the child to acquire stability. The social worker may spend relatively little time in direct contact alone with the child, but will develop or modify techniques and procedures as may be required to accomplish his particular objectives. These objectives may include:

1. Strengthening the parent's belief in the competency of the child.
2. Adding to the general public understanding of hearing impairment.
3. Reducing the number of unfortunate life entanglements the hearing impaired child may encounter.
4. Giving the school insights into the child's home as well as to the pressures and resources found there.
5. Assisting parents in supplying moral and social training needed to support the school's instructional program.

In practice, the social worker must analyze in detail the total forces, objects and events which make up the child's situation. Each aspect of the child's surroundings must be carefully evaluated as to its impact upon the child. Identifying sources of demands and pressures which must be counterbalanced or compensated for, as well as the positive resources which can be mobilized for support and strength is a continual function of the social worker. The child's innate abilities and current developmental stage constitute the focal point for planning an intervention program. Closely related is the assessment of the parent. Unless the age, interests, intellectual level, sex, background, maturity, and education of the parent is considered, the best intended approach may prove ineffectual or even evoke detrimental reactions. As a final aspect of the diagnostic study, the social worker ascertains the general harmony of the interpersonal relationships found in the home.

Any specifics the social worker may apply in providing service must be given in the framework of this carefully made accounting of the child and his surroundings. Much of the social worker's effectiveness will be determined by explanations and demonstrations which promote desired relationships between significant persons. A growth medium favorable for the child is achieved by clarifying confusing (even if well intended) statements gained from friends, relatives,

the literature, and varied professionals. Growth is initiated by demonstrations, acceptance, and belief in the child, but is maintained by the child's achievements.

Working With Parents

Common problems. Whether the social worker deals with the parent, the child, the teacher, or other professional workers, there are common concerns which make it possible for the services to be delivered ultimately to the child. Points for intervention can be selected on the basis of convenience and availability so long as processes of child development are followed. Establishing realistic expectations, handling emotional feelings, or setting up limits for behavior should all be directed so as to enable the hearing impaired child to have the same experiences as the hearing child. The only difference may be in the way in which the happenings are experienced. The same concerns for limits which will foster internal controls and for reinforcement which will promote the selection of approved patterns of behavior apply to the hearing and the normal child.

Parental reaction to being informed they have a hearing impaired child is generally severe and takes the form of extremes from a blanket of overprotection to a denial of all problems. Questions as to the essential competency of the child, a common reaction for all parents, are intensified when the child has a hearing loss. These doubts about competency will reoccur with each new developmental task. Reassurance takes the same form as for the normal child. If there is any "difference" in dealing with the hearing impaired child, it is the emphasis which must be made in encouraging the hearing impaired child to deal with sound. Relationships with the hearing impaired child must concentrate on helping the child localize, identify, and associate sounds.

Working in the home. The social worker will find it necessary to enter the child's home to deliver needed services, especially when the child is less than school age. Going to the home has the advantage of informality, using the natural situation in which the child is developing, and greater parental ease from the assurance of familiar surroundings. Typically, the contacts will be mostly with the mother since it is the mother who spends the most time with the child. The father, other members of the family, and other persons in the home cannot be shunted aside and forgotten. The worker must be knowledgeable about the field of hearing impairments and the availability of community resources if he is to be a dependable and strong source of information and assistance to parents. A display of confidence and assuredness in coping with the problems will do the most for restoring the parent's feelings of adequacy and convincing them of the advisability of entering into realistic planning for the child's future.

The worker should be alert for indications of feelings of guilt and/or wishes to place the blame for the child's hearing impairment. These feelings are typical of initial parental reactions. They should

be met with the strongest countermeasures since to pursue such concerns is a worthless effort. Such efforts actually take up energies and resources which are needed for constructive planning for the child. Immediately supplying simple and direct answers to parents' questions and assigning the parent's responsibilities for carrying out normal child care functions are the two most important ways by which the parents can be assured as to the basic competency of the child and of their own adequacy as parents. Securing parental support can best be accomplished by the reassurances which are gained as the parent sees the child achieve everyday routines of sleeping, eating, playing, and dressing.

Making maximum use of these common developmental activities, the case worker keeps in close contact with the mother. The worker is supportive of the mother's efforts, arranging demonstrations to show the mother how to carry out new developmental tasks that anticipate the child's development rate. As the mother feels sufficiently confident to carry out these activities independently, the worker may then observe the mother and offer additional constructive suggestions. Care must be exercised that such critique sessions do not deal solely with the mistakes the mother makes. Such reactions would serve to undermine the mother's confidence. The worker must assess the interactions between the child and other members of the family in this same format, providing demonstrations and offering constructive advice relative to the specialized training or different procedures the non-hearing child may follow in accomplishing a task.

Every activity, each contact with the hearing impaired child, must allow for making the child aware of sound. The child must be specifically shown sources of sounds, have different sounds pointed out, helped to find the sources of sounds, taught to associate correctly those activities which are initiated by sounds. The emphasis on training for sound is essential and must be pursued endlessly and energetically. Sounds made by the washing machine, the telephone, TV, radio, and vacuum sweeper are usually employed. These sounds may be supplemented by noise-making toys and whistles. Equally important household noises include a dropped pan or dish, a slammed door, a sneeze, or clicking ventilators. With only a little imagination, a game of visual "hide and seek" can become a game of "find the sound." Qualitative and quantitative differences in sounds must be stressed. As the child goes on normal outside the home excursions, trains, automobiles, factories, buses, trucks, sirens and all the large world of sounds become objects which must be pointed out and identified for the child.

Throughout all this concentrated effort to make the hearing impaired child aware of sound, there must be provision for the rights of the parents and other members of the family. It is unrealistic to expect the parent or other family members to build their entire lives around the hearing impaired child. A situation in which everything centers about the child represents the ultimate in overprotection and

constitutes an elaborate denial of the child. To expect the parent or siblings to spend their day in serving the child is more likely to produce a marked resentment and rejection of the child. Other siblings have a right to their share of the parental financial and personal resources. The goal is to bring the child into the family and society as a normal, contributing, individual. The resolution of disturbed interfamily relationships will require special effort on the part of the worker, but the nature of the adjustment within the family is the prototype of adjustment into the community and society. Once the child has been accepted and approved within the family, it is for the family members to field questions from peers (Can he play?) or from other adults (Should we pity him because he's dumb?).

Working in agencies. Case work services supplied in a community agency such as a hospital, clinic, or school are an essential arm of delivery of service to the hearing impaired child. In fact, the first contact between the parents and social worker generally takes place in some agency where parents have been advised of the child's impairment, or where parents have gone seeking assistance. Working with parents in an agency has unique advantages which the worker must weigh in deciding where it is best to begin contacts with the parent. The agency staff usually has a number of specialists, audiologists, and educators. The worker should draw upon the resources of these persons in his work with the hearing impaired child. Possibly the greatest advantage of agencies is to be found in the strong support which parents are able to give each other in parent groups organized by the agency staff. There are few things so reassuring as knowing that someone else has successfully traveled the road one is contemplating. A parent will often accept what another parent says more readily than that which is tendered by the caseworker. One of the added benefits is that the experienced parent actually becomes stronger and more assured out of the realization that they are able to help someone less fortunate.

Routinely, the parents should be moved into those parent groups which are generally an integral aspect of early school programs. The social worker and teacher may provide the impetus to get such groups started, but once under way, they are best left to the management of the parent participants. The caseworker may even do "baby sitting" to enable parents to attend such group meetings. In other instances, severe marital or emotional problems identified in the parents may be of such complexity as to be deemed unsuitable for treatment by the worker in the home. Referral to an appropriate agency may be the only hope for ultimately making parental resources available for the child. The worker should be especially alert to the possibility of a marked emotional reaction as parents are first informed of the fact that their child has a hearing impairment. The level of frustration rises when the parents realize their functions and activities will be restricted for an unknown period of time. Pressures and tensions mount when no immediate solutions to the circumstances

are available. The child is affected by the prevailing resentment and tension and may develop pathological responses in reaction to the emotional pressures.

Early identification and intervention will reduce the consequences of emotional turmoil that tends to take the form of acute episodes. Sudden disorganization of habitual living routines, withdrawal from participation in usual social patterns, and prolonged overlays of sullen despondency are clues which suggest the more extreme emotional upsets. Treatment of these intense states usually requires assistance from other professional specialists. The entire family may have to be referred to a community agency in some instances.

Delivering casework services to the hearing impaired child may involve choosing between working with the parent in the home or in the agency. Each situation should be evaluated as to the possibility of identifying the most effective means for attaining particular goals. Most objectives may eventually be accomplished in either the home or the agency. A decision to work in one or the other place may be arrived at arbitrarily. There is justification for using an ideal approach combining contacts in the home and in the agency. There may be an early concentration of contacts in the home and a later change to a pattern of less frequent sessions in some agency, possibly in connection with participation in a parent group. Rather than attempting to decide the conditions of exclusion which would dictate the allocation of services only to the home or the agency, it is preferable to consider how the two situations can be mobilized to provide maximum continual services to the child.

Working With The Child

The social worker will have occasion to work directly with the hearing impaired child, accomplishing the same objectives and using much the same techniques as are found in working with the hearing child. Even though progress may move at a somewhat slower pace, it is most significant to show the child different *ways* to do the same things that the hearing child can do. Difficulties in communication may pose technical problems, but it is the responsibility of the caseworker to develop techniques for overcoming such barriers. The chance to form contacts and to share a relationship with a new but understanding person may be of great benefit to the child even when there are no pressing social adjustment problems. The child must continue to acquire language and to develop proficiency in expressing himself.

Variations of play therapy and role playing may be particularly helpful. Finding words for new objects, labeling feelings, and describing new activities are particulars from which communication develops. Ego building procedures can be used effectively to assist in the formation of constructive attitudes about the limitations of having a hearing impairment. Correcting misunderstandings will reduce

anxieties to a more tolerable level. In the process of establishing communication, the worker must exercise caution not to exaggerate or to oversimplify the child's difficulties. It is advisable to plan for allocating a longer than usual time for the therapy session. Preliminary visits in the classroom where the child's modes for communication are observed can be valuable preparation for quickly effecting a workable therapy relationship.

Consultation With Other Professionals

Interspersed in all functions carried out by the case worker is the task of interpreting and explaining the nature of hearing impairment. While the worker participates in specialized technical training preliminary to engaging in work with hearing impaired children, each child is different and poses unique problems which must be resolved by specific activities. The worker must then develop and maintain active contacts with other professionals as sources for clarifying technical points and as the means for keeping apprised of the newest advances in technology. Consultative functions may take the form of specialized support which increases the ability of the child to profit from specialized services to be given by another professional.

When working in association with the physician, the case worker may give parents lengthy explanations of the hearing loss, detailing the nature of the condition, reviewing etiological and prognostic implications, and outlining possibilities for treatment. Interpretations of the functions of the various specialists who will deal with the child and discussions of community resources offering assistance can be reassuring to the parent. In another phase of this contact, the caseworker may prepare parent and child for surgical procedures, thus conserving the physician's time.

Contacts with the audiologist are sources of important consultation duties. The caseworker must frequently assume the same responsibilities for follow-up interpretation and clarification of what the audiologist said and did after the parent and child have left the clinic. The caseworker must see that the recommendations made by the audiologist are carried out in the home, that the child uses his hearing aid as prescribed. Instruction in the use of the aid may have to be repeated and alternative directions given. The worker is frequently delegated responsibility for advising the parents when the child should be seen by the audiologist for follow-up examinations. The worker may also have the responsibility for seeing that follow-up appointments are kept.

Another professional specialist with whom the caseworker has frequent conferences and shared responsibilities is the psychologist. The psychologist must have information about the child's home and family as a part of the data that will be considered in arriving at a psychological evaluation. One efficient procedure in the diagnostic study of the family sees the social worker making a study of the home and family in an interview with the parents while the psychologist

is working with the child. In follow-up contacts with the parents, the social worker may interpret psychological findings or see that recommendations made by the psychologist are carried out. The social worker maintains a continual appraisal of the home and shares this with other professionals, requesting re-evaluations and follow-up services from these professionals as there are indications of the need.

The most important consultative relationship is that between the social worker and the teacher. The school is organized for delivering instruction. Teachers are not ordinarily trained to work with social and emotional adjustment problems of the child. As a result, they are much less likely to be trained in procedures for working with a parent's social and emotional problems. A gap is created by the tendency for children with hearing impairments to be more vulnerable to social and emotional problems which can severely limit their capacity for new learning. The social worker is concerned with maximizing the effectiveness of the instructional program by counteracting the deleterious consequences of social and emotional adjustment problems and by giving the parents techniques for continuing instructional processes in the home. Getting the parents to continue with school initiated training may be the more important step for closing the gap which stands as a barrier to successes.

The intent of involving the parent's potential for supplementing the instructional program is not that of converting the parent into a professional teacher. These functions are adequately carried out by the classroom teacher. Rather, the goal is that of securing the best of parent-child relationships and family interactions for the child. In this way, the likelihood of the child having normal experiences in ways appropriate for his communication problem is heightened. As a step in promoting the desired parent involvement, the school must share goals and strategies with the parent. Full parental cooperation is assured when the parent is actively participating in the decision making processes. Cooperation diminishes when the parent is merely apprised of program changes. Extending support and approval to the parent is the more certain way for evoking reciprocated support and approval for what the school is trying to do. Confusion and misunderstandings which can disrupt the cooperative relationship between the school and the parent can be minimized by working out agreements with clear delineation of what responsibilities the parent is to assume and what responsibilities the school will carry out. The social worker has the function of assessing parental progress in the attainment of established goals. He must also be alert for indications that the parent requires assistance in achieving an objective.

Placement Services

Making arrangements for the child to be transplanted to a situation other than his current home is a service historically supplied by caseworkers. As with any of the other types of services provided, placement is invoked in an effort to continue normal growth and de-

velopmental processes for the child. Since growth and development proceed along patterns which are individual, considerations leading to placement will be different for each child. Many children with hearing losses may require temporary placement, a few will require permanent changes in their home situation. In some instances, an entire family may be given temporary placement for purposes of providing a specialized service such as intensive family counseling.

Placement may be indicated for such benign purposes as the proper fitting or adjustment of a hearing aid, to instruct the parent in the operation and use of a hearing aid, or for purposes of performing medical examinations or corrective surgery. Such placements are of a brief and temporary nature and cause little difficulty. They should be planned carefully, however, and the child should be advised of the move whenever possible.

Placements for longer periods of time are often made in order to enable the child to attend a school program. Residential schools have largely given way to day school programs, but there are still some areas where the hearing impaired must attend a residential type school. This is generally true for sparsely populated areas. It may also be the educational method of choice for children who have other major learning impairments (severe emotional or physical motor deficits) in addition to the hearing loss. Arrangements vary considerably. In some instances, the child may spend "school days" in residence and return to his home for week-ends and school holidays. A similar arrangement finds the child living in a foster home while attending a near-by day school through the school days and going back to his regular home week-ends. Such foster home placements are made as a way of reducing the amount of daily travel the child might have to make to attend school. This plan should be considered when the child lives fifty miles or more from the school he must attend. The actual decision is made in consideration of age of the child, accessibility of transportation and general convenience to the child. Placement in a residential school may be made with the understanding that the child will stay at the school all of the time except for usual lengthy holidays such as Christmas and summer vacation periods. Specific arrangements should be worked out with the school staff. In some instances, the school staff may wish to have around-the-clock supervision of the child as a way of accomplishing particular educational goals more readily. Residential schools often have caseworkers on the staff who serve as contacts with the child's family.

In any event, the caseworker should carefully arrange details of the placement in joint planning sessions with the child, parents, other professionals, and the school. Intensive support for the child and parents may be necessary to get things operating on a smooth basis. Placement, even of a temporary nature, is a new adjustment and places stresses upon the child and the family. For this reason, placement should not be made without a careful study to ascertain the relative advantages and disadvantages. There should be definite

prospects for a favorable outcome for the child. This may require pre-placement training sessions with the child and foster parents. The following guideline are useful in arriving at a decision regarding placement:

1. The parent's own needs cause them to be so deeply involved with the child as to prevent the child from profiting from any environmental modifications and yet the parents are unable to accept treatment for themselves.
2. The mother is absent from the home and there is no adequate mother substitute.
3. The care of the child places a disproportionate drain on the resources of the parents and home.
4. The child has not been able to profit from help supplied by local procedures and facilities.
5. An appropriate source of needed service has been identified.
6. The child has the capacity to profit from the services available at the new resource.

Summary of Case Work Services

Case work services have the goal of integrating into an effective chain the array of professional services required by the hearing impaired child. The hearing impaired child must be made aware of sound, but the awareness must be achieved in the natural developmental activities normally experienced by all children. Coordinating the multiplicity of instructions, demands, and suggestions made by the otologist, audiologist, psychologist and educator is essential for keeping the home and family from being overwhelmed and disorganized. A breakdown in the home and family organization can have costly consequences, denying the child the opportunity for acquiring socialization skills which will be the basis for successful adjustment in school, on the job, and in the community.

Evidence regarding the significance of early experiences for adjustment is accumulating. If the serious consequences of maladjustment are to be avoided, parents must become effective in their relationships with the deaf child while he is still in infancy. Having a deaf child imposes demands on all parents. The intensity of the pressures is related to the parents' maturity, resources available for assistance, and the amount of support given the parents. Making a new adjustment is troublesome for all persons and requires patience and hard work. Facts and figures may be useful in maintaining an adjustment, but promoting behavioral changes requires the manipulation of feelings and attitudes. The case worker seeks to establish a consistency and stability that will enable the child to acquire a sensitivity for sound and, ultimately, an acceptable communication form.

Our society is a complex one made up of many groups having different beliefs, customs, values, and languages. There are added sources of variations in the many acceptable patterns of family dy-

namics and parent-child interactions. A "good" parent must often carry out contradictory behaviors in fulfilling that role. The social worker must be aware of these variations, understand them, and be able to manage and organize them so as to give the hearing impaired child maximum opportunities.

The social worker must be thoroughly familiar with all the technical aspects of hearing impairments, and the processes for treatment and education. The worker must have the closest contact with the teacher in order to insure that the instructional objectives of the school are understood and supported by parents. The mother is frequently the focus of the case worker's contacts, and efforts to stimulate the child's interest in sounds are emphasized in routine living activities of cleaning the house, playing, care of clothing, meal preparation, shopping, and eating. Each such activity must be viewed as an opportunity for building communicative facility, just as the hearing child acquires language out of normal everyday activities. This approach must be pursued intently and exhaustively explored in every detail before communication is attempted by another method (speech reading, tactile or kinesthetic means).

The most difficult task for the case worker is concerned with the reassurance of parents. When parents themselves feel inadequate, they are likely to conclude that their hearing impaired child will also be inadequate. Concerns about competency which are likely to intensify with each successive new developmental task are best allayed by demonstrated achievement by the child. The mastery of one developmental task often raises the child to a level where new obstacles and pressures must be dealt with. The effective case worker recognizes that the organization of a healthy personality begins at birth and that there is no fixed formula or easy recipe which can be supplied to the rearing of all hearing impaired children.

CHAPTER IV
PSYCHOLOGICAL EVALUATION OF HEARING IMPAIRED CHILDREN

The psychologist, possibly more than any other professional specialist, deals with the total functional capacity of the individual. Psychological evaluation of performance considers the array of potentials which the person possesses and the effectiveness with which the potential is used. Discrepancies between potential and achievement are of special interest for the psychologist who seeks to minimize this difference. As a consequence of the concern for evaluating functioning, the psychologist has become skilled in the analysis of performance, developed techniques for measuring many attributes contributing to performance, and studied factors influencing behavioral outcomes. These skills, techniques, and knowledge of behavior comprise the psychologists' professional armamentum which is primarily directed to the three areas of intellectual ability, socialization skills, and emotional controls.

Identifying Potentials For Performance

As a preliminary step in the analysis of a person's capacity for interacting with his surroundings, the psychologist obtains measures of capacities which are used for responding. Before any set of recommendations regarding a treatment or educational plan can be formulated, it is essential to know the person's

1. Intellectual ability
2. Intactness of sensory-motor potential for responding
3. Values, motivations and expectations
4. Current developmental stage
5. Family and home background
6. Degree of control for his emotions and energies
7. Capacity for communication

These variables are assessed indirectly by techniques which evoke responses requiring these factors in a specified set of circumstances. The influence of the variables is assumed from the performance as observed in a carefully controlled setting. Such indirect methods result in sizeable measurement errors in all instances. Factors such as motivation, interest, or parental attitudes toward a child are much more difficult to assess than are variables such as sensory-motor skill or vocabulary. The possibilities for measurement errors are increased for such mediated variables. Psychological assessment procedures rely on the collection of samples of functioning and for this reason a short title "sampling" would be more accurate than the more familiar "testing." Obtaining samples of children's behavior must be carried out in the face of obstructions which center about the infirm structure of the child's personality and the child's limited experience in dealing with demands made of him. As a consequence, normal ranges of

errors in measurements are increased when working with a child. Data regarding abilities can be interpreted with somewhat more reliability than that bearing on personality or social background, yet information from all three areas is essential for making a useful picture of the child's potential for learning and adjustment.

Assessment of abilities. Psychologists have been the most successful in the assessment of discrete abilities. Motor skills, problem solving, memory, vocabulary, music, mathematics, and reading are examples of some specific skills which can be easily measured. The psychological evaluation often centers about information obtained from a measure of general intellectual ability. Scores from such scales have been found to be useful predictors for indicating how well the person will do in such life situations as school and on the job. For children, the scores are particularly useful when expressed in a unit which relates to chronological age. Mental ages, learning ages, and test ages are examples of indices which can be used to say how the child's potential for learning compares to other children with whom he may be grouped for instruction. It is important to select a measuring scale which has been standardized for use with children of the subject's age and which has been validated against criteria that correlate with the performance to be predicted. This information is given in the standardization and normative data reported for the scale and should be consulted before selecting the measuring scales to be used.

Personality assessment. Measuring personality variables such as motivation, self-confidence, persistence, reality checking equipment, and emotional controls is essential for predicting how abilities are organized within an individual for use in coping. Personality evaluation is much more complicated than is the measuring of abilities. The difficulties are increased when the evaluation is to be carried out on children whose personalities have less structure than those of adults and who are less experienced in reporting their likes and dislikes, their feelings, and wishes than are adults. Most personality assessment techniques were originally developed for use with adults and are not suitable for application to children. The most useful information about the child's personality organization may be revealed in the way in which the child attempts to cope with the measuring scale rather than in the specific content responses which are elicited. Even though a difficult task, an assessment of personality variables must be a part of any meaningful psychological evaluation. To accomplish this challenging task, the psychologist must be familiar with child development stages and processes and experienced in working with children. Normative data gained from adults has limited or no applicability to children.

Assessment of social adjustment. Ascertaining the child's family and home background and his relationships with other persons in his surroundings rounds out the basic information needed to make reasonably valid statements about the child's capacity to function in

any given situation. Degrees of independence-dependency, language facility, values and standards of the parents, and vocational objectives are factors contributing heavily to sustain the performance of an individual. Homes which appear to be equal in physical aspects may differentially influence school achievement and have varied effects on the acquisition of attitudes. The child's home, family, and surroundings must be regarded as having a number of specific characteristics which can exist in various combinations. Measuring these variables as a part of the psychological evaluation usually resolves itself to compiling a description of the child's surroundings. There are no measuring scales which can yield information comparable to that provided by a developmental and family history. The child is seldom able to give a picture of the structure of forces and factors in his surroundings which shape and reinforce his behavior. The assessment can be made in an interview with the parents responding to questions that will provide an account of current, past, and potential elements within the child's environment that can positively or negatively affect development.

Processes of behavior functioning. Data collected about the individual's abilities, skills, social and emotional adjustment must be fitted into a scheme of performance. Functioning is initiated by motivational components of drive or interest. Persistence, conformity, and expectation of success maintain the performance. The cessation of performance is brought about by the realization of pleasant or unpleasant consequences. Prediction of individual accomplishment, the objective of individual psychological evaluation, is possible only after aligning along the sequence of performance such ascertained variables as vocabulary, arithmetic skill, activity level, self-acceptance, expectation of success, self-confidence, trust in other persons, and so on. The psychologist also gives consideration to influence in the form of aspirations, values, and goals as these are organized in the individual's personality make-up and as they impinge on him from his social surroundings of family and membership groups. The conditions and processes of learning constitute the matrix for integrating all of these variables into a meaningful picture of how the individual will cope with new demands and pressures. Put in the most simple terms, having a complete assessment of how the individual has learned in the past and what he has for learning makes it possible to say how the person will learn at this time.

Psychological Services In The Schools

The professional skills of the psychologist have proven useful to industry and to schools where there is a common concern with training, efficiency in performance, and identification of individual potential. Psychologists serve schools primarily by supplying measurement-evaluation, diagnostic-counseling, and learning-performance information.

Measurement evaluation functions. The assessment of potential for

learning and of attainment from learning experiences is possibly the unique contribution made by the school psychologist. Psychologists carry out other functions, but these other functions (counseling, consultation, diagnosis) are shared in varying degrees with other professionals. By way of ascertaining potential for learning, the psychologist collects data regarding the child's intellectual ability, emotional maturity, social development, and related special aptitudes. Standardized measuring scales popularly referred to as "tests," observation in various situations, and interviews are some of the means the psychologist utilizes for collecting information. Data may be taken from a group of pupils, but more often the psychologist prefers to see a child individually. Working with the child individually permits the psychologist to exercise greater control over noise or distractions which might interfere and prevent the child from doing his best. In the close proximity of a one-to-one relationship, the psychologist is better able to maintain adequate communication and the highest interest of the child for the tasks presented.

The measurement of performance outcomes may entail the use of some of the same techniques of standardized scales, observation, and interviews. The school psychologist may be less involved in the ascertainment of academic achievement, possibly because of the high development of "achievement tests" which are extensively used in the schools. Most achievement tests indicate the pupil's progress in mastery of academic subject content presented in the classroom. This is an immediate concern of the teacher who usually administers such tests one or two times yearly, sharing the results with all appropriate persons. Measures of achievement are compared with measures of potential for achievement (ability) in evaluating the general functional effectiveness of the individual being studied.

Diagnosis and counseling. Like medical diagnosis, psychological diagnosis seeks to discover the reasons why the child is not achieving. However, the diagnostic study carried out by the psychologist cannot stop with the deficits, but must search out the assets possessed by the child. These assets become the basis for an effective treatment program. In order to make a proper diagnosis, the psychologist must have a reasonable statement of the adjustment problem, the symptoms of the difficulty. Information the psychologist collects about the child's intellectual ability, aptitudes, emotional maturity, and social development must be supplemented by details as to the child's physical health and family-home background. Psychological diagnosis is, then, a complex and intricate process which integrates abilities the child has for meeting demands, the nature of the expectancies confronting the child, and the resources available for assisting the child. A skillful accounting of these areas usually suggests several treatment approaches which may be invoked for correcting the child's adjustment difficulty.

Counseling, another major function of the psychologist, refers to a wide range of procedures which have the general purpose of im-

proving personal effectiveness by increasing the individual's understanding of a specific problem he faces or by adding to his general skill in solving adjustment difficulties. It frequently entails reviewing the individual's emotional feelings, exploring attitudes acquired in similar experiences in the past, and considering ways for meeting the stress situation. In view of the wide range of procedures that are involved, it is apparent that counseling can be carried on at many levels, extending from long term remodeling of personality structure to more simple procedures such as the giving of advice on how to comb hair in a more presentable style. It is also apparent that counseling is a skill which is performed by various other professionals and even by non-professionals. It is advisable to recommend that only trained professionals be involved in the more stringent processes of counseling such as those which entail reorganization of personality structures.

Counseling as administered by the psychologist is likely to be given individually to pupils or parents in a series of sessions. It is seldom that a single session is sufficient for effecting desired changes and even when initially agreed upon, ways for fostering new patterns of behavior must be reviewed and modified in follow-up counseling interviews. Procedures which were appropriate for initiating behavior may not be suitable for maintaining it. Parents and teachers who often are the important persons in regulating behavior by the giving of reward or punishment, differ in the type of reward or punishment they can comfortably work with in assisting the child. Children will be found to differ individually with respect to the type of consequence which is most effective for them.

Learning-performance consultation. The psychologist spends a large portion of his time confering with teachers and other school staff persons. This important function, which contrasts with the traditional individual orientation of the clinician, enables the psychologist to share his knowledge of technical learning processes and variables governing performances with persons on the school staff who will then make applications of the information in their contacts with pupils. In this way, the services of the psychologist are greatly extended. In these contacts, the psychologist may meet with school committees and advise about building sound mental health practices into the school curriculum, selecting psychologically appropriate instructional materials, or presenting a series of in-service training sessions for the staff. The place of practice, readiness, motivation, and the influence of praise and reproof in learning must be interpreted to the teacher and related to pupil learning activities such as reading and the multiplication tables. The advantages and disadvantages of learning by rote, by similarities, or by differences should be considered for maximum efficiency in choosing instructional methods.

The pupil does most of his learning in a group where he must wait his turn, watch others respond, and pay attention to the teacher as the group leader. Performance is sustained by the group members'

reactions to the individual and the psychologist must understand fully the social learning processes of imitation and identification. Status and recognition given by the group are frequently of greater importance for the pupil than are the approvals or rebuffs given by the teacher. In the final stages of mature development, the person comes to rely on his own internalized direction and guidance mechanisms for regulating and sustaining his performance. Helping the teacher to see that children do not have the same expectations, energy levels, or satisfaction from a particular reward can enable the incorporation of these variations into effective instructional groups in the classroom.

Delivery of Psychological Services In The Schools

The psychologist may serve the school as a measurement specialist outlining the group testing and evaluation program, as a diagnostician who sees pupils individually on referral, or as a kind of social development learning engineer. Which of the roles is to be assumed is dictated by the larger objectives of the school. The school has traditionally been organized to provide instructional services as evidenced by the teacher, classroom, and pupils. Learning activities are presented to groups. Concerns for improving instructional services have encouraged the addition of non-educational services, or "support" services. Professionals included in the support services group include social workers, guidance counselors, psychologists, nurses, speech pathologists, and others. They are often organized into a "pupil personnel services" division where they learn to work in close cooperation, reducing overlap and making effective utilization of each other's professional skills.

The psychologist who works in the school must become familiar with the school organization, objectives, methods and the various supportive personnel. Instruction is centered about the classroom teacher. The methods and materials of instruction are rather uniform. Modifications in the regular curriculum are usually designated by some different title, such as "special education." Such separate instructional facilities represent attempts to provide an educational program for pupils who cannot be fitted into the regular classroom because of one or another barrier to learning. Such pupils may collectively be designated as educationally "exceptional." Special teachers, methods, and materials are provided for these pupils. Pupils become eligible for placement in these classes on the basis of meeting specified criteria, established in part on the basis of psychological evaluation. Psychologists may spend a major portion of their time working with such pupils.

Psychological Evaluation of The Hearing Impaired

Procedures for carrying out a psychological evaluation outlined in this section can be said to apply generally to persons with a hearing impairment, but an effort has been made to emphasize work with children who have hearing deficits. This emphasis will be readily

acceptable to persons with prior experience in working with children, and it will be quickly realized by the novice who engages in the evaluation of hearing impaired children. The discussion will also place importance on collecting data which can be used to plan a relevant educational program.

Study of referral materials. The child will usually be referred for psychological evaluation by the teacher or by another professional who is working with the child. Less frequently, requests for psychological evaluation originate from parents. Many psychologists have developed a referral form which when filled out supplies basic information about the child. Identifying data (name, birthdate, parents, siblings, residence), developmental history, schooling, and social interests are areas commonly covered on the referral form. Most important is a brief statement of the reason why the child is referred for psychological evaluation. The more specific the reason for referral, the more likely the psychologist will be able to collect information so as to be able to answer the questions posed. The basic referral form should be supplemented by other related information. The kind of home, compatibility and resources of the parents, educational level of the parents, number of siblings, and the emotional climate of the family are essential items in establishing the family and home background of the child. A recent physical examination and reports of findings made by medical specialists are necessary for clarifying the health status of the child. Summary reports of services given by other professional workers (speech pathologists, social worker, etc.) serve to complete a picture of what has been attempted up to this time.

For hearing impaired children, it is essential to have a recent otological and audiological examination. These reports should describe the nature of the hearing loss, levels of reception for sound, and indicate the treatment and prognosis. It is possible to approximate information regarding early development or family-home background, but the otological and audiometric data cannot be replicated by the psychologist. Where critically needed information is not available, such as details about resources in the home or the accessibility of counseling services in the community, final treatment recommendations may have to be deferred until this information is obtained. The more complete the supporting information that accompanies the request for psychological evaluation, the more specific and comprehensive the treatment program that can be outlined following the psychological evaluation.

Observation of the child. Even though the psychologist spends a relatively extended time period ranging from one and one-half to three hours with the person referred for psychological diagnostic study, this is a comparatively brief time for collecting data from which life-long decisions may be evolved. Complete supporting and background data and the possession of usual communication facility

ordinarily makes this an adequate examination session. Adjustments must be made where these requirements are not fulfilled. The hearing impaired child, especially those of early and pre-school ages, rarely has well developed communicative skills. It is advisable to carry-out observations of the child preliminary to engaging in the actual assessment session. The observation serves two major purposes. The psychologist can find out the degree of communication ability which the child has attained by watching him working in the classroom. The psychologist should not expect, however, to effect the same level of proficiency in communication with the young child as maintains between the child and the teacher who is more familiar to the child. A second advantage found in preliminary observation of the child is the opportunity to study first hand the child's emotional reactions and socialization skills. These personality variables, difficult to evaluate for all children, are extremely difficult to assess in the hearing impaired child because of the limited amount of verbal ability.

The value of the observation will be greatly enhanced by the psychologist having some direct contact with the child. This may take the form of a brief activity such as examination of a piece of equipment or a toy, or going for a short walk. Most programs include a routine "juice time" or "snack time" break in the mid-morning or afternoon. Such sessions tend to be informal and visitors are welcomed to such socialization activities. These are ideal occasions for making the child's acquaintance and carrying out observations of the child. Time for the observation should be routinely included in the total procedures used to evaluate the hearing impaired child. With older children, less time may be required for observation in the classroom. A recommended procedure would entail a brief visit with an introduction to the child and an explanation that the child will be coming to the psychologist's office at a prescribed time. The child should then be expected to come on his own to keep the appointment. Younger children should be met at the classroom and should walk with the psychologist to the examining office.

Selection of measuring devices. Choosing the most appropriate measuring scales is of crucial importance in the evaluation of the hearing impaired child. This is an important consideration for all children, but existing measuring scales may place the hearing impaired at the greatest disadvantage of any of the exceptional groups. Even so called "performance" or "nonverbal" scales require a surprising degree of verbal ability in order for the person to understand directions or to give answers to these items. This factor, coupled with the very low rating of performance and nonverbal scales as predictors of academic achievement, questions the advisability of using most of the popular psychological measuring scales in examining the hearing impaired. At the same time, the exclusive use of scales and techniques designed only for the hearing impaired does not seem justifiable in view of the goal of integrating the hearing impaired and preparing them for competition with normal hearing persons.

The choice of psychoeducational measuring scales for evaluating the hearing impaired must take all of these variables into account. The psychologist is advised to review carefully the nature of the normative group on which the scale was standardized. It is preferable to try to adapt or to modify within limits a scale which was standardized on persons of the same age as the prospective subject. Scales which have extended scores by extrapolation to include a wider age range than was in the original standardization group should be avoided. It is advisable to use a scale which includes sizable groups of hearing impaired in the standardization group, particularly for pre-school and early school aged children. The following scales are recommended for consideration:

1. Hiskey-Nebraska Test of Learning Aptitude
2. Snidjers-Oomen Nonverbal Intelligence Test
3. Ontario School Abilities Examination Scale

Each of these scales presents certain problems. The lower age limit of the Hiskey-Nebraska is 4 years and that of the Ontario Scale only 5 years. The Ontario Scale is now out of print. The Snidjers-Oomen has not at this time been standardized on groups in the United States. Directions are in English, however, and it has proven successful for use with children in most countries in Europe, including England. Children at two years of age were in the normative group and the materials have a high appeal to the preschool age child, similar to Stanford-Binet Scale materials. It seems especially suited for young children who have severe degrees of hearing losses. The Stanford-Binet Scale itself has many items in the Year II to Year V levels which can be administered with pantomined directions. The Wechsler Scales are of questionable value for use with hearing impaired children less than 12 years of age. The Columbia Mental Maturity Scale, as recently revised, may prove a useful supportive measuring scale. Items from developmental scales such as those of Gessell and Ilg, or Bayley, while not providing a complete picture, can contribute important information about the difficult to assess preschool hearing impaired child.

Assessment of personality variables, a problematic matter with regard to all children, becomes a hazardous undertaking when working with the young hearing impaired child. Some variation of the "draw-a-person" technique can frequently be administered, but the personal experiences of the child, the backdrop against which any personality data must be brought into focus, remain an unknown area. Personality assessment of the hearing impaired child may best be carried out on the basis of data gained in lengthy observation of the child's reactions and responses to various demands and situations. Hypotheses generated by these observations can be explored in later discussions with parents and teachers of the child.

Carrying out the Psychological Evaluation. Guidelines for working with the hearing impaired child are summed aptly by the phrase

"Patience and caution." Being unable to establish contact with the world by the usual communication channels poses severe pressures for the hearing impaired child. Heightened uncertainty as a consequence of not having the comforting reassurances that everyday sounds can provide renders these children especially vulnerable to frustration. The delay in acquisition of language which the hearing impaired child experiences impedes progression in other developmental areas including socialization skills. The absence of language forces the psychologist to rely on analysis of behavioral responses made by the hearing impaired child. These responses must be compared with norms for the developmental stage of the child for interpretation.

Even when there have been prior contacts with the child, there must be provision for an ample "warm-up" time as the psychologist undertakes to carry out a psychological evaluation. The initial approaches with the hearing impaired child can best be made in some type of play activity. Playing with a soft rubber ball or a large wheeled toy is usually appealing to both young girls and boys. More than just getting acquainted, if carefully chosen and implemented, this initial play activity can provide valuable information about motor development, coordination, and personality traits. Opportunities are available for quickly establishing the verbal and other communicative skills possessed by the child. The play activity can easily lead into the more formal administration of other items. In addition to the usual scores and indices (IQ, MA), allowance must be given to the fact that the child with a hearing deficit will use sight, touch, smell, taste, touch and kinesthetic information in relating to the world. The intactness of all these channels and their suitability for learning must be ascertained and included in the psychologist's assessment of the child.

Frequent breaks in the form of changes of pace and variations in types of materials presented will help to sustain the child's interest. Recalling the generally low frustration tolerance level of the hearing impaired child, the psychologist should avoid building up anxiety by pressing the child to complete any task, especially during a first session. It is seldom that urgencies in the disposition of the young child dictate having absolute data from the psychologist. The psychologist would be advised to be more concerned with maintaining a positive relationship with the child, even to the end of terminating a session if necessary before an objective score is obtained. Seeing the child in several sessions will provide a more reliable picture. The next session will be easier if the first has gone smoothly. The psychologist will be accorded greater support from other professionals working with the child if the child is given the benefit of the doubt, at least initially. The kinds of errors which may accrue from giving an optimistic qualitative picture of a young child are relatively easy to correct in future years. Errors which are consequences of an overly severe evaluation may not be corrected by any future effort.

Differential diagnostic considerations. The hearing impaired are one of the groups most subject to errors in diagnostic evaluation. Since the lack of language facility reduces the extent to which they can cope with many psychoeducational tasks, their less than average performance may be regarded as indicative of mental retardation. The marked susceptibility to mild frustration and the inability to understand what is expected of them can be interpreted as poor emotional control and negativism, resulting in a mistaken classification of emotional disorder. The psychologist is frequently faced with having to make a differential diagnosis. These criteria can be helpful in making a correct classification:

1. Data submitted with the referral or that consulted in making a final diagnosis should include a recent audiometric evaluation, at least in a screening form.
2. The functioning of the mentally retarded person is uniformly below average and shows little variation from one type of task to another.
3. Functioning of the emotionally disturbed is characterized by variation and inconsistency which follows no discernible pattern.
4. The performance of the hearing impaired child may "average" out to be a level below normal, and there is likely to be extreme variation in ability to deal with various tasks. However:
   a. Performance is higher on tasks which require minimal language, and performance is lowest on tasks requiring maximum language ability.
   b. Performance in nonlanguage areas is in the normal range.
   c. The degree of language ability required serves as a consistent explanation for good and poor performance.

Reporting psychological findings. Methods for reporting findings obtained in psychological evaluation depend in large measure on the closeness of the psychologist to the treatment program. Communication by means of a formal written report is likely to prevail where the psychologist is removed from the scene of the treatment program. In such instances, the psychologist should endeavor to put together as detailed an account of his impressions and as clear a statement of recommendations as is possible. Negative, pathogenic, and deficit findings require the most careful handling since the report tends to be afforded an aura of finality on the basis of it being written. Unless couched as possibilities which bear additional study, mention of negative and deficit findings can be used as a basis for excluding a child from essential treatment, inviting the possibility of irreversibly damaging experiences. Clinicians who supply only written reports should make it their responsibility to make regular followups of the use, comprehensibility, and adequacy of the reports they submit.

Psychologists who are regular members of the treatment team have the distinct advantage of being able to present their findings as

oral reports, generally in a staffing conference or a parent interview. Written records in such settings are less detailed and consist more of brief summaries of the conferences. This arrangement has many advantages which result in high quality services to the child. The staff members develop close communication lines in their daily working relationships. Questions which arise can be readily taken to the professional person concerned for answer. Essential follow-up is a built-in feature of having the treatment team directly involved in the management of the treatment program. Missing gaps in the information can generally be supplied on the spot by some member of the treatment team.

Working With Parents

Collecting background information about the child's family, home, and early development, interpreting the significance of psychological findings, and counseling are the major functions of the psychologist working with the parents of hearing impaired children. The amount and nature of these functions will vary from one to another situation. All of these functions may be carried out by other professional workers (teachers, social workers, physicians). Local assignments are usually made so as to get maximum benefit from the array of skills represented in the staff complement. The psychologist may thus give his time exclusively to diagnostic evaluations, seeing only those parents who insist on personal interviews. When such requests for direct contacts are made, they should be acceded to since this can build confidence in the entire treatment team. In some instances, the psychologist may share some of these functions in joint sessions with parents and other staff members. At other times, the psychologist may wish to train other staff members to do some of the routine aspects of these functions, thus permitting the psychologist to give more of his time to technical procedures.

Collecting information regarding the family, home, and early developmental pattern of the child is most easily accomplished by following a developmental history form. Parents are usually accustomed to giving such information and can be made to feel quite comfortable in the structured framework of the "case history." The psychologist must be careful to differentiate objective from subjective data. Subjective reports, however, may be the most useful in planning a treatment program. When both parents are present, some questions should be directed to each parent; all questions should be left open for discussion since the parents can easily see the child feeling different ways about school or his older sibling. Neither or both may be correct. Parental differences should not be encouraged to a heated point, and the psychologist should be alert to counter feelings of parental guilt. Even though information is as yet tentative, the psychologist should endeavor to answer all questions in simple and straightforward terms. If the psychologist is not certain of the answer, he should say when he will be prepared to answer the question

or who will provide an answer (audiologist, otologist, teacher).

Interpreting psychological findings is possibly the area most open to errors by the psychologist. The parent will typically nod in assent or look as if he understands what has been said and rush away with a hurt and frustrated feeling of not having been told anything. The psychologist must remember that he has had years of professional training and experience, whereas these things are all new to the parent. Explanations are best given in a dialogue format in which the parent asks questions and the psychologist gives answers. Most parents are equally unprepared to carry out such a role and may state simply that they have no questions. This can be very true when the parent is stunned by the realization of the child's predicament. It may require a lengthy period of time for them to recover so as to be able to frame questions. It is advisable to proceed cautiously and to give the parent several explanations. Immediate and long range objectives should be given, and the degree of certainty surrounding each finding should be shared with the parent. If the psychologist has already completed his contacts with the child, there is some advantage in combining the collection of background data and leading into an interpretive session in the last part of the interview. The parent will have been made to feel comfortable by the structure and routine of the history taking phase of the interview, and an effective level of communication has usually developed between the psychologist and the parent that will facilitate the interpretation. In any event, interpretation is a complex matter which is constantly changing because it reflects the changes in the child. It is best handled as an ongoing process with periodic sessions with the parent in which progress is reviewed and future objectives considered.

Counseling with parents may be the least essential of the psychologist's contribution to a treatment program for hearing impaired children despite the fact that such children are more than usually dependent on their parents to "hear" and to interpret the world for them. As a corollary, being a parent to a hearing impaired child places more than the usual demand on the parent. The parent cannot expect to fulfill this obligation by turning the child over to the school. The parent must be reassured that even though the child is unlikely to be a musician or to attend most colleges, he is able to achieve independent vocational and social status as an adult. Rather than permitting the parent to worry and wander, constructive use of the parental resources should be pursued. Counseling, then, is an important aspect of a treatment program. It can also be the difference in the child making a successful or an unsuccessful adjustment at school. In most instances, parents require only moderate support and encouragement and may, in fact, receive the greatest benefit from participating in group counseling sessions with other parents of children with hearing impairments. The psychologist may be more effective by restricting his counseling services to the more serious problems referred by the teacher or social worker. This will enable the psychologist to give the bulk of his counseling time to assisting

the teacher and social worker to carry out counseling services with individual and groups of parents.

Summary

Psychological services for the hearing impaired child are an integral part of the total treatment program. The particular contributions made by the psychologist center about his knowledge of the learning process, understanding of the way in which we become organized to cope with demands, familiarization with normal developmental stages and processes, and skills in the assessment of behavior. The psychologist should have specialized training in order to apply his skills effectively to the problems of the hearing impaired child. The psychologist works most effectively as a member of a treatment team made up of teachers and social workers. He may be especially suited to carry out a differential diagnostic study. In a consultant role, the psychologist may assist teachers in carrying out interpretive and counseling functions.

CHAPTER V
EDUCATIONAL PROGRAMING FOR THE HEARING IMPAIRED

The concept of habilitation by educational approaches has possibly enjoyed greater acceptance as being applicable to the hearing impaired than for any other exceptional group. The persistence of this belief in the face of rather limited successes raises interesting questions about the objectives, instructional methods, and actual support of education for the hearing impaired. In this chapter, the evolution of educational provisions for the hearing impaired will be reviewed against a backdrop of types of educational facilities. Content and materials will receive only cursory consideration so as to allow greater exposition of curricular organizations and instructional objectives.

Throughout all the discussion, the key role of the teacher of hearing impaired children is acknowledged.

Development of educational programs for hearing impaired. Interest in the education of persons with hearing losses is a long standing concern of society. Interestingly, efforts to educate the mentally retarded and the hearing impaired have been closely related. Recent evidence about the stunting consequences accruing from sensory deprivation and the success of concrete and tangible approaches in educating the mentally retarded suggest some justification for this association. Recognition of the relationship between the habilitation of the mentally retarded and the hearing impaired serves as an ideal point for exploration and study of present efforts to educate the hearing impaired and is revealing of many puzzling educational practices.

As societies become more complex, demands for everyday living are increased. There are more persons who because of some impairment are unable to adjust in society. These handicapped individuals become wards of society. In the process of caring for these individuals, information is accumulated which eventually provides a complete picture of the handicapping condition. As school attendance became compulsory, handicapping conditions were studied at earlier years and over longer periods of time. At first, there was little concern on the part of the public schools for educating those handicapped children who did not fit into the common school. Dismissed as "uneducable," they were sent to institutions where they might be cared for and protected. Under these conditions, custodial concerns of providing food, clothing, and shelter were paramount, and a gross diagnosis was sufficient.

The possibility for providing training to handicapped children was nurtured by the patience and belief of a few more humanely oriented administrators of early institutions and by the devoted staff members of small special schools maintained by church groups. The preparation of teachers for work with the handicapped and appro-

priate materials and methods of instruction developed outside the main teacher training colleges, reinforcing the separation of the handicapped from the normal child, a practice which is still a severe problem. The lack of a common unifying set of objectives encompassing all schools for the hearing impaired possibly encouraged the growth of different instructional methods, the oral versus the manual approaches, a controversy which has not been reconciled.

The teacher of the hearing impaired. There are few jobs in all society which demand so much of the individual as is required of the teacher who works with the hearing impaired. Teachers of the hearing impaired must be prepared in the usual skills of ways for teaching the child the variety of reading, writing, arithmetic, science, sociology, and arts included in the ordinary school curriculum. In addition, the teacher must have an understanding of the complex matter of language acquisition and structure, skills which the hearing child brings with his as he enters school. Knowing speech reading and manual forms for communication require competencies equivalent to a detailed command of a foreign language. The teacher must function as an on-the-spot electronics-sound engineer in operating and maintaining the sophisticated electrical apparatus which is commonly used in the classroom by the hearing impaired child. Details of the job market and the regular school curriculum are necessary base line data for placing the child into a suitable niche in society. The impetus of early school education has required a comprehensive grasp of child development and growth processes and the acquisition of techniques for working with parents of the hearing impaired child. Topping all these requirements is the necessity for the teacher to have a minimum understanding of the fields of otology, audiology, and psychology so as to be able to communicate with professionals from these areas and to translate their recommendations into meaningful classroom activities for the child.

In the past, teachers were prepared in various centers to work with hearing impaired children. Frequently, the teacher was trained on the job in the residential school center where she was assigned. Another pattern involves assigning the teacher to several training centers, including a regular teacher training college and a special school for hearing impaired. Increasingly, the preparation of teachers for the hearing impaired is being included as a special area available at regular teacher training colleges. The wide background of training and experience necessary to perform adequately on the job makes it likely that preparation of these specialist teachers will take longer than the amount of time allocated for the training of teachers for regular classrooms. Despite the erratic methods for preparing teachers to work with hearing impaired children, the continued progress in habilitating these children is evidence of the dedication and resourcefulness of teachers of the hearing impaired.

Special teachers working with the hearing impaired are frequently confused with speech correctionists (speech pathologists)

because both are concerned with training for effective use of speech in communication. A distinction can be made on the basis of the teacher of the hearing impaired working with those children who have a hearing loss whereas the speech pathologist works with children who have normal hearing. Another closely related specialist, the audiologist, is trained in the assessment of ability to receive sound and in the possibilities for amplification of sound.

Educational Classification of Hearing Impairment

Frequent reference has been made to "types" of hearing impairment in this discussion. Classifications are most useful when treatment implications are associated with the grouping. Classifications will be found to vary from one professional person to another. That is, the physician, the psychologist, the audiologist, and the teacher may (and should) have different systems of classification, even for the same child. The variations do not imply that one or the other is more correct, but simply reflect the fact that these professional workers carry out different treatment functions.

The important variable for educational classification is the influence of the hearing loss on communication. Most speech sounds require a minimum hearing acuity of 40 dB (ISO) in order to be heard. A hearing loss at 60 dB (ISO) or greater renders the individual unable to receive practically all sounds unless amplification is provided. These points are educationally significant. Speech sounds have frequencies ranging from about 250 cycles/sec up to about 2,000 cycles/sec. The vowel sounds are in the lower range of frequencies (750 cycles/sec. or lower). Sounds of the consonants are in the upper frequency ranges (750 to 2,000 cycles/sec.). The range in which the loss is incurred must also be considered in planning an educational program. A third consideration is the developmental stage in which the loss is acquired. The child who has heard the sounds of language and experienced the patterns of speech before losing hearing requires an entirely different educational program than does the child who has never heard.

Hard of hearing. Individuals in this group have losses of hearing falling in the 30 dB to 60 dB range, approximately. The loss tends to be one which is acquired during the early childhood period, often before the age of 6 years. Persons in this group have usually experienced a wide range of sounds and speech patterns. Under certain conditions, they can hear very well, a factor which makes the hearing loss difficult to identify. The individual himself is often puzzled and may not recognize he has a significant hearing loss. Such persons may be thought to be emotionally disturbed or mentally retarded on the basis of their erratic functioning. The educational correction of the disability is a matter of "language stimulation," or the extension and refinement of basic language processes which the individual has attained. Hearing aids, surgical correction, or medication can produce dramatic results. Numerically the larger group of hearing impaired,

the hard of hearing are seldom identified until they have experienced an accumulation of failures. The consequences of their many failures add to the difficulty in providing effective correction for these children.

Educationally deaf. The educationally deaf are those persons who are unable to use hearing as a major learning input channel. This includes persons in the severe and profound hearing loss ranges, or losses of 60 dB or greater. The loss tends to be of a congenital origin or one acquired before the age of 18 months, so that these persons have minimal or no experience in hearing sounds or speech patterns. In the past, it was difficult to assess the hearing of babies and infants with severe hearing losses. Consequently, they were often regarded as mentally retarded. Refinements in diagnostic techniques and recognition of the importance of early screening of hearing ability have resulted in more of these children being correctly identified.

The educationally deaf frequently have sensori-neural damage making correction by surgery or medication of limited effectiveness. In a few instances, surgery may be used to rebuild parts of the ear, but hearing aids are the most relied upon in rehabilitation. The effectiveness of hearing aids has been greatly increased by technical improvements. Nevertheless, the inability to correct damage to the auditory apparatus, particularly the auditory nerve, leaves no choice but to rely on other than speech for communication. Educationally, the approach has been that designated as "language building," a complex and prolonged effort to supply language facility for communication using other than the auditory in-put channel. The favored alternative in-put channel has been the visual with oral or manual out-put.

Educational Approaches Related To Type of Hearing Loss

Although the hearing impaired share the common characteristics of having limited reception for sound, the limitation is acquired in different ways, at different times, and in different degrees for any one individual. As a corollary, an effective rehabilitation program often must be individually designed for each child, although a few objectives apply to all educative efforts. The person must be given some type of communication ability, expressions for his own thoughts and ways to understand others. The stunting of potential for dealing with the world, a consequence of the deprivation associated with an auditory loss, must be guarded against. Measures must be instituted for countering the tendency for secondary adjustment problems, especially emotional maladjustment, to develop as a result of frequent failure experiences.

Planning an educational program for the hearing impaired must make allowance for the tendency for auditory impairments to have accompanying disabilities in other areas (vision, motor, and intellectual). The program should take into consideration the possibility

that the basis for all subsequent learning is provided by experiences incurred in infancy. The assumption, however accurate, that the impairment of a hearing loss is inability to acquire language has been taken as justification for a major emphasis on building language, perhaps inviting a sacrifice of other learning experiences.

It is believed the child ordinarily hears and takes in language during his first year and works on expressive and interpretative speech during the second year. The first year is given to learning to listen, the second to learning to talk. Linguists think a hearing child has heard all speech sounds and patterns by age three years. The details of language acquisition are not known, but ability to hear is crucial. Language is not normally acquired by visual clues. The visual characteristics of speech are poorly understood, and visual representations of language are misleading and ambiguous. Even though the hearing child acquires language with an ease which peaks in infancy, a lengthy period of time is required for this learning. No child learns everything on the first try. There must be many repetitions, practice, and continued corrections. Some aspects of language are mastered readily by one child whereas another child may learn other features about language from the same experience. These individual variations must be acknowledged in a program which recognizes the competencies and limitations of the several groups of hearing impaired.

Educating the hard of hearing. The hard of hearing person who might also be classed as "partially hearing," has some usable hearing. Typically, a portion of the sounds in the speech range are heard, but others are not. The fact that some sounds are received and reacted to normally makes it difficult to identify these persons, a major barrier to be resolved in providing an appropriate corrective program. The situation can be puzzling to the individual himself who is unaware that he is missing something until the gap is filled in by amplification or other stimulation.

Correction of the disability may be relatively easily accomplished with a hearing aid if the loss is of uniform level for the speech range. Where the loss is greater for some frequencies than for other frequencies, training in the use of the aid with supplementary information from visual clues is required. In such instances, special training which heightens auditory discrimination increases the person's ability to deal with sound. The importance of building correction around and including the residual hearing is evident in the term "auditory training" which is frequently used to designate the educational program provided for the partially hearing child.

Educating the deaf. The deaf are those persons whose hearing loss is so great that they can be said to receive no usable sound stimulation, especially no usable speech sounds. The deaf experience severe and prolonged frustration as they attempt to cope with the world, a large part of which is excluded from them. The objective in re-

habilitation of the deaf is that of providing some adequate form of communication. The major approach has been that of concentrating on supplying the deaf person with speech, as is implied in the term "language building" which is generally used to designate the educational program presented for the deaf.

The education of the deaf has been plagued with confusing beliefs and practices. There has been little systematic attempt to carry out evaluations of the various approaches. Although there are the inevitable exceptions, it must be conceded that most deaf persons do not acquire socially usable facility in speech after a decade of intensive training. In the so called oral or "speech reading" method, emphasis is concentrated on clues from lip movements as a way of interpreting speech. Another method is one which attempts to use a kind of hand language in communication. The manual and the oral methods have uniquely associated strengths and weaknesses.

Improvements in the efficiency of hearing aids have made it feasible for most deaf persons to have significant benefits from amplification. Particularly where the aid is supplied early in life, the hearing aid is assuming a greater importance in the habilitation of the deaf. Recent developments have entailed the combining of oral, manual, visual, kinesthetic and amplfiication techniques into an integrated multisensory kind of training.

Educating the adventitious hearing impaired. The key word designating this group of persons with hearing losses is "adventitious," acknowledging that the loss was incurred after the first two or three years of life. Persons with an adventitious hearing loss, then, have heard the sounds and the patterns of speech. In former years, this may have been the more numerous of the hearing impaired because of the obvious possibility for identification of the loss. Persons who have experienced the sounds of speech should more readily transfer this experience to another set of clues. They should be better able to become proficient in speech reading because they are more certain about what they are looking for.

Advances in medical care and the consequent reduction of hearing losses as sequalae to many illnesses has reduced the frequency of this type of loss, particularly among the youthful population. Adventitious type losses are common in the aged. The possibility that the adventitiously hearing impaired profited rather readily from the oral method of instruction may account for some of the present confusion in instructional approaches. Allowances must be made for the fact that they entered the educational program with a considerable language base including words, sentences, and language concepts. They presented problems which responded favorably to the oral method, even without the additional benefit of amplification.

Educating the congenitally hearing impaired. The congenitally hearing impaired are those persons who incur hearing losses before age two or three years. Many persons in this group are born with the loss. They have none or an extremely limited base of the words,

sentences, and patterns which constitute speech. Having no base for relating the visual characteristics of language, they find it difficult to interpret speech visually.

The congenitally deaf have in the past had to acquire speech on the basis of visual clues, a difficult and exacting task. Recent improvements in the design and efficiency of hearing aids have made it possible to include amplification as an integral part of their training. This development is especially fortunate since congenital hearing losses tend to be severe, but are seldom total losses of hearing. In the past, the congenitally hearing impaired have been able to communicate most easily by a manual method.

Education for unilateral hearing impairment. Unilateral is the term which designates individuals who have a hearing loss in only one ear. The losses can extend over the complete range of intensities and frequencies, and the type of educational problem associated with the loss will be largely a function of the area of speech sounds which is involved. In the past, the usual method for dealing with unilateral hearing losses was one of instructing the individual in how to position himself so as to make effective use of the normal ear. In the classroom, for example, it would be advisable to seat a child so that the good ear would be directed toward the teacher and to avoid arrangements wherein the good ear would be subjected to extraneous noises from blowers, machinery, or street commotion which would compete with and mask the incoming speech sounds. Since it is not always possible to make such arrangements, many persons with unilateral losses have benefitted from a special hearing aid which picks up sounds striking the ear which has the loss. The sounds are then carried over to the good ear where they can be picked up. Such "cross-over" hearing aids have also been found to facilitate location of sounds by restoring the "depth" quality of sounds.

Bilateral hearing impairments. Bilateral hearing losses are those in which there is a loss in both ears. The degree of loss does not need to be the same in both ears, and, in fact, this is rarely the case. Typically, the loss differs in each ear. Most hearing losses are of the bilateral type. The kind of educational problems presented will be more related to other aspects of the hearing loss, such as degree of loss, and the life stage in which the loss was incurred (adventitious or congenital). Amplification will usually be a prominent part in the rehabilitation. Advances in technology of hearing aids have made it possible to design a hearing aid separately for each ear, whereas in the past only one ear was selected for amplification. This device, known as a "binuaral hearing aid," greatly improves the effectiveness of the amplification by reducing the masking effects of extraneous noises and by increasing the amount of stimulation delivered for interpretation.

Choice of Communication Methods

The oral method of communication. The so-called "oral" method of

instruction for the hearing impaired seeks to train the person to "read" speech as said by another person on the basis of clues given by lip movements made in talking. The hearing impaired person is taught to make respondent speech by an elaborate set of techniques which supply visual clues in the form of diagrammatic pictures. This is supplemented by the tactile and kinesthetic clues of vocal sounds, expiration of air, and position of speech apparatus components (tongue, lips, teeth) in making speech sounds. Charts and diagrams are used for a guide to train speech patterns of sentences and phrases.

The rationale underlying the oral method can, on first glance, seem very logical. When we think of people communicating in everyday situations, we are referring to talking. Language has observable visual characteristics. The spoken word is the common mode of communicating. People understand and use speech. To be able to speech read and to respond with speech sounds produced by a vocal apparatus which is generally intact for the hearing impaired seems a natural compensatory approach. Persons who are able to perfect this technique can communicate with an amazing ease and seem to have no impairment from their disability.

In actuality, only a few persons are able to gain proficiency in the "pure oral method," even after prolonged training. Speech is sound, the production of which gives rise to some visual phenomena, but all the characteristics of speech are not visible. The tongue, throat, and chest do things which are expressed in sound but not in vision. Speech emitted by some persons has prominent visual features whereas the same sounds made by other persons have minimal visual cues. Despite the use of detailed pictures which diagram the position of the lips when making speech sounds and the taking of motion pictures of the mouth of persons speaking, much of speech simply cannot be seen or shown.

To what extent feedback and monitoring of one's own speech sounds, a rather continuous action for the normal hearing person, contributes to speech facility and acquisition is largely conjectural. Studies of delayed auditory feedback design suggest this ordinarily little noticed monitoring act has a profound role in regulating our speech. No matter how well the individual acquires speech reading ability, there is as yet no workable method for supplying the same visual clues that would permit the deaf person to monitor visually his speech. The face-to-face position deemed essential for effective speech reading is itself an artificial stance not generally replicated in most social situations. The degree of concentration required for speech reading greatly restricts the deaf person's capacity for interacting with other aspects of his surroundings.

In consideration of these limitations, the outsider generally raises serious questions as to why the oral method is adhered to by some teachers of the deaf. Teacher advocates of the oral method are apparently willing to accept the small gains achieved. Mitigating these negative considerations are the history of successes with the

adventitiously deaf, the ease with which some persons acquire speech reading skill, and the hard fact that there is no better alternative for communication available to the deaf. Growing interest in the education of the deaf and application of research techniques may provide information needed to answer what presently stands as a critical issue.

The manual method of communication. As is implied in the name, this is a form of communication in which ideas are conveyed by movements of the hands. Although an ancient form of communication and one frequently used to overcome barriers of language, its application to the communication problems of the deaf is a rather recent move. The gestures that we commonly use in communication are examples of some highly developed forms of manual communication. As used with the deaf, the manual method, also known as the "simultaneous method," has two components. The letters of the alphabet are made by configurations of the fingers, permitting any word to be spelled out. Entire words, phrases, and ideas can be expressed in gesture-like movements of the hands and arms. A natural mode of communication, sign language is easily learned and requires a minimum of instructional materials. Finger spelling permits great precision while the hand-formed signs enable more speed.

The manual method has the advantage of being an entirely visual form of communication. The structural forms and patterns and the individual nuances of expression observed in speech have visual homologs in the sign language. A manual method has been found to be particularly well suited for the congenitally deaf. The deaf readily learn this form of communication which has developmental stages that replicate those observed in the acquisition of spoken language. Sign language is rather well suited for communicating to groups.

The manual form of communication is not without disadvantages, and these must be weighed in deciding which communication method is to be chosen. Although the manual method seems to be learned more rapidly and with less effort than is speech reading, both methods require the individual to direct his attention narrowly, focusing on visual clues for communication. The distance that sign language can be seen exceeds that at which speech can be read, but it is still limited. The greatest restriction associated with a manual form of communication is that the sign language is in every way, a foreign language. The consequences of this are varied disadvantages. Very few persons know the sign language so the persons available for communication are scarce. Learning to read and to write English is more difficult because the person has no previous experience with that language. A final factor to be considered is that the processes for producing sign language are slow and laborious, wearisome traits which can invite boredom and disinterest. The net effect of relying on manual communication is a marked tendency to remove the person from the mainstream of society as most of the persons know it

and to promote undesirable in-grouping and social restriction for the deaf.

Combination communication methods. In the past, teachers working with the deaf have aligned themselves with the oral or the manual method with a rigid loyalty which outside observers found disturbing. Communication is a necessary activity, the essence of interpersonal relationships, and it mirrors the complexity of interpersonal relations. Communication is not purely oral, nor is it made up entirely of gestures. In the natural spontaneous form, communication makes use of any channel for self-expression. The influx of newly trained persons has resulted in many new changes in the education of the deaf. Among the more promising innovations is the effort to combine characteristics of the manual and the oral methods, building a communication method which incorporates the desirable aspects of both.

The specificity of the manual method permits the child to acquire precise communication skill in the normal course of development. The child can rather quickly acquire a considerable vocabulary. Success with one form of communication encourages the child to try another, and he accepts speech reading as an extension of something he already knows. The manual method stands as a strong basis to fall back upon whenever there is any difficulty. The combination method apparently is well suited for use by all persons, irrespective of the degree of hearing loss. Capitalizing on what are already natural forms of communication, it encourages the person to express himself, choosing whatever method he prefers.

The possibilities of the combined method are suggested by the preliminary report of its application in a California public school. In this project, hearing impaired children were placed in regular classrooms with normal hearing classmates. There was an intensified emphasis on communication to the point of using any method for getting a message across. All children and teachers in the school were taught sign language and finger spelling. In this rather open situation, a surprising number of deaf children were able to participate and to carry on in regular classes, a marked reversal of the usual condition in which the hearing impaired remain isolated in their special private world, the classroom for the deaf. Although not without some problems, one of the greatest of which is the enormity of the task of teaching sign language to everyone, this project may provide a whole new structure for the education of the deaf: a structure in which the objective of preparation for full and independent participation in society can become actualized.

Examples of Educational Facilities

As is the case for most impairing conditions, the first centers offering care for persons who had lost their hearing were mainly custodial facilities providing shelter and a "humane" chance to live

out the remaining years of life. Yet out of these crude beginnings evolved present treatment and rehabilitation methods. Successes, even in limited degree, with what were generally the most severely impaired cases encouraged the less severely handicapped to seek assistance. Educational facilities for the hearing impaired have advanced greatly since the early custodial care oriented centers, and each type of facility tends to offer a rather specialized set of services.

Residential schools. Residential schools, also popularly known as "training schools," were established in most states and in many metropolitan areas by 1900. Supported by state governments and, in some instances, by church or other benevolent groups, residential schools have tended to operate independently of the public school programs. Children are often age 7 or 8 years when admitted to residential schools in contrast to the 5 or 6 year age for entrance in the public schools. Residential schools have the advantage of being able to work with a pupil 24 hours of the day without interruption. They can provide a consistent, coordinated, and structured set of experiences. Residential schools tend to have a complete staff of teachers and supporting specialists from otology, audiology, and psychology. These supporting professionals are familiar with the educational programs and are skilled in being able to apply their professional knowledge so as to enhance the child's classroom learning. In the residential school, the pupil is not subject to many of the pressures for achievement which exist in the public schools, and there are usually opportunities for individualized instructional sessions where needed. Training for vocational placement is given high consideration as an educational objective.

Disadvantages associated with attending residential schools are largely those stemming from their isolated nature. Often geographically situated in secluded locations, the isolation is reinforced by the school's common purpose of caring for a group of persons who have a communication problem, and by the self-sufficient nature of the institution. Social relationships are artificial, there is little encouragement or chance to perfect socially realistic communication skills, and a dependent, restricted life orientation can easily be acquired by the students.

Placement in a residential school should be made only after careful study of the resources available and the educational potential of the child. In some sparsely populated areas, residential schools have the only program for hearing impaired children. Where there are several places offering programs, the choice may be dictated by a necessity to neutralize undesirable home influences, or to take advantage of a particular service available at the residential school. Residential schools, for example, are usually able to provide both manual and oral communication instruction, and they are better equipped to educate the child with multiple handicaps. Some residential schools offer excellent vocational training opportunities.

The increase in the number of day school programs for the

hearing impaired has resulted in a decrease in residential schools and a marked reduction in the number of pupils they serve. Pupils in residential schools tend to be educationally deaf, unable to learn speech reading, have other major impairments (visual, mental, motor, social-emotional disabilities), or require special vocational training.

Day schools. Day schools are close approximations of the residential schools in terms of instructional program, types of pupils served, staff and physical facilities. Generally located in larger metropolitan centers, pupils with hearing impairments are transported from their homes into these special schools, presumably on the basis of being able to have the advantage of services from the supplementary staff (social workers, audiologists, otologists, psychologists) which supports the classroom teachers. It is claimed that the centralization arrangement of day schools permits more effective utilization of the costly amplification and electronic equipment used in the education of the hearing impaired. Day schools are administered as an arm of the local public schools and have the same possibilities for parental involvement contact, and support.

The same limitations observed for residential schools apply to most day schools. Although administratively a part of the local public school system, there it little interaction between the day school attended by hearing impaired and other schools in the system. Where there is interaction with pupils from other schools, the hearing impaired are frequently subject to cruel social treatment. The collection of hearing impaired pupils into one special school places these pupils in a socially defensive position and sets them up for ostracism and stereotyping. Pressures for academic achievement are great and relentless. There is little time or provision for individualization of instruction. Parental support or assistance for pupils in need may not be forthcoming. The oral communication method is frequently an exclusive offering despite the fact that many pupils are unable to acquire proficiency in this skill. A disproportionate amount of time may be given to teaching oral communication at the cost of other learnings.

The advantages of having a "normal" home life and community participation are thus, in reality, seldom materialized by the day school. In fact, the day school can be cited as being the least desirable arrangement for educating the hearing impaired. Placement in a day school is often dictated by the lack of other facilities and by local rules requiring pupils to be enrolled in programs offered by their school district. Administrators of some day schools are endeavoring to correct these deficiencies by creating more social interaction with other schools and increasing the participation in community processes, especially vocationally related activities. Pupils in day schools tend to be educationally deaf, have only an auditory disability, and to be proficient in speech reading.

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Special classes. Perhaps the most frequent to be found facility for

educating the hearing impaired is the special class. In this arrangement, classes located in various public schools are staffed and equipped to serve pupils having hearing impairments. Pupils with hearing impairments are admitted to these special classes on the basis of study and recommendations made by a group of specialists, usually otologist, audiologist, psychologist, social worker, and teacher of the hearing impaired. The teacher-pupil ratio is small, approximately one-fifth that of the regular class. Most of the pupils are transported to the class from adjacent neighborhoods, although a few will reside in the neighborhood served by the school in which the special class is located. The curriculum for the special class is one developed for the hearing impaired child. A considerable block of time is given to language building, leaving less instructional time for subject matter areas. As the hearing impaired child acquires sufficient skill in communication, he may be "integrated" and scheduled to attend a regular class for specified activities.

In practice, special class arrangements for educating the hearing impaired have proven less ideal than was expected. It is true that the hearing impaired live with their families, attend regular schools, are free to participate in community activities, and have a wide range of potential friends. But, the hearing impaired are still grouped with other hearing impaired and their entire activities, social and recreational, center about the educational grouping. The disproportionate amount of time given to language instruction means less time to master other school subjects at the same rate and level as their age mates. Integration experiences in the regular classrooms are brief encounters which do not really allow time for an adjustment. The hearing impaired must work long and diligently and have less time to participate in the community. Their skill in communication lags behind that of their hearing peers, and the pupils remain encapsulated in the special class.

The hard of hearing and the educationally deaf are eligible for special class placement, although they are grouped separately. Pupils in special classes tend to be educationally deaf. Special classes, as presently operated, may have more to offer the hard of hearing than to the deaf. Unfortunately, the hard of hearing are seldom identified routinely, and when discovered, many educators are not convinced they require special help. There are no training programs which prepare a special teacher specifically to work with the hard of hearing child. Efforts to correct the segregation and to promote more social interaction for hearing impaired pupils are being tried out in some areas, but only on a limited scale.

Preschool programs. The establishment of preschool, or early school, programs is the most indicative measure of the intention to go all out by way of providing an educational sequence appropriate for the hearing impaired. Located in public schools, nursery schools, residential schools and sometimes in isolation from any other school, preschool programs are staffed by teachers trained to work with the

hearing impaired, by child development specialists, and by social workers. Audiological, otological and psychological services are available. Teacher-pupil ratios are very small, and there is much individual work. Parents are shown how to continue desired practices and training when the child is at home. Children are admitted to preschool programs at age two years. Training is cast in a series of developmentally normal experiences. Objectives include early identification and educational description of the hearing loss, socialization training for later school learning situations, training in use of amplification, and the building of communication skills. The child is surrounded with sounds as a way of preserving and maintaining small residuals of hearing. Routine medical, audiological, and psychological evaluations are made.

Relatively new and unproven, preschool programs seem capable of providing effective counter measures for correcting and alleviating many of the difficulties encountered in educating the hearing impaired. Getting at the problem early can forestall many later difficulties and reduce the severity of others. Education really begins at birth for the hearing child. Tolerance for repetitive activities and an active interest in finding out about the world are characteristics of the infant and young child. The task of educating the hearing impaired child demands beginning as early as possible. Training in use of amplification and communication skills acquired in this preschool period may reduce the lag in achievement and permit the hearing impaired child to participate and to profit from taking part in normal social experiences with his peers. Such favorable outcomes outweigh the objections that preschool programs are too expensive.

Educational Objectives and Activities

"Hearing impairment," is a general term designating a disability which exists in individual degrees and with individually relevant consequences. Speech, personality development, social adjustment, and vocational success are generally affected to some extent. Providing an appropriate education for such individuals requires as a first step a thorough identification-diagnostic study which details the characteristics of the hearing loss for that individual, as well as the intact resources the individual possesses. The molding of these assets and deficits in the structure of social and vocational requirements and possibilities is the general objective of all education.

Building an effective form of communication, compensating for diminished auditory sensory input, training in the use of amplification devices, and guarding against a proneness for sociocultural isolationism are the "extra" objectives of education for the hearing impaired. Possibly the most successful job could be done with the hard of hearing group, but there is as yet little acceptance of special educational needs for this group who require special assistance in use of amplification and speech reading. Most of the discussion that follows applies to the educationally deaf.

Sense training. Advantage is taken of intact sensory input channels as a way of compensating for the auditory loss. This training is especially to be observed in the initial preschool or primary school programs. Emphasis is on fostering ability to make differences and similarities on the basis of visual, olfactory, gustatory, kinesthetic, or tactile stimulation. The visual input modality is especially worked (in many respects, probably overworked) in color identification, matching of forms, recognition of objects, reproducing letters and shapes. Visual discrimination, memory, sequencing and patterning are the basic abilities required of the hearing impaired child. The child is trained to keep his eyes fixed on a very narrow visual field, the lips, at the cost of spontaneity and freedom, features conspiciously diminished in the classroom for the hearing impaired.

Auditory training. Specialized training in the use of residual hearing, entailing possible amplification and a kind of speech reading was formerly limited to the hard of hearing. Advances in amplification now make this an important part of the deaf child's learning experiences. The child is subject to an exaggerated emphasis on sounds. It must be pointed out to the child that most objects (washing machines, doors, animals, people) have sounds. Localization, discrimination, memory, and patterns are aspects of sounds in addition to loudness and pitch. The child with some loss of hearing will discover there are sounds he does not hear. He discovers that he has sounds himself. He learns to get and to give messages from sounds, to communicate. Auditory training may entail use of amplification, but it is more than just finding a hearing aid for the child. Generally presented in the preschool or primary school program, the trend is to have parents carry out much of this "surrounding the child with sounds" experience at home, thus making school time available for other training.

Communication training. Communication is the most important, the most controversial, and the most time and energy consuming of all educational activities for the hearing impaired. And with all the effort given, it frequently has the least successful outcome of all educational objectives. No really acceptable solution has been worked out, although the problem is, perhaps for the first time, being thoroughly studied from objective and subjective considerations. Manual training is preferable for many reasons, but fails as an effective communication method because it is known by only a few persons.

The oral method, basically speech reading, is widely preferred among educators of the deaf, possibly because a few persons do become proficient in this skill. There are many puzzling, contradictory, and argumentative issues associated with the oral method which are not germaine to this exposition. Current approaches to training speech reading entail making use of the infancy period when the child is normally finding out about his surroundings. The infant's attention is directed to lip movements and ideally these are related to the "babbling stage" which even the congenitally deaf are said

to manifest. Concentration on identifying lip movements and associating these cues to speech continues. As the child becomes older, a wide variety of charts, diagrams, labels, pictures, and schematic representations are used by the teacher. Tactile and kinesthetic stimulation is used to a small degree to teach certain invisible features of speech. Mirrors, video tapes, and motion pictures have been found useful.

The procedure is an arduous and never-ending one. Even though the teacher attempts to teach number concepts, give time, place, and person orientation and build a conception of the organization of the community, there just is not enough time and something must be omitted. Most often the reduction is that of less time for academic learning, and less time for socialization training. Vocabulary building is slowed by the difficulty in finding visual representations for many concepts, such as "friends," "hungry," "end," "go," and "talk," just to mention a few. Toward the end of the primary grades (age 9 or 10), more attention is given to academic instruction, but the deaf seldom have the vocabulary to proceed at this with any speed. Conventional visual instructional materials (textbooks, charts, lecture, film strips) are used for presenting academic content.

Socialization training. Learning how to get along in groups, wait one's turn, pay attention to a leader, and to carry out the give and take of social interactions begins in the home, but is given systematic attention in the preschool and primary grades. Socialization training, as presented at school, is often limited to those social skills required for participation in the classroom and neglects other necessary social skills. During the middle school years, there is little time allowed for socialization training even though this is a critical period of social adjustment for all children. The deaf person continues to lag behind his hearing peers in socialization knowledge up into early adulthood years.

During the middle school grades, frequently not until the junior high school level, the deaf are scheduled for a limited amount of time in regular classes. Physical education, art, or mathematics are usually chosen. This attempt at integration is often unsuccessful for many reasons, mostly centering about the inability to communicate. These failures serve to discourage additional such efforts and strengthen the case for special classes. This is an unfortunate result.

Vocational training. Preparing the deaf for an occupation is frequently delayed on the basis of needing more time for perfecting communication ability and catching up in academic skills. Most teachers of the deaf seem to be trained with an academic orientation and are not prepared to give vocational instruction. The most dependable vocational training is presented by the Office of Vocational Rehabilitation and may begin in the high school if the local school is willing to cooperate. When cooperation cannot be arranged, vocational training may be delayed until the person graduates from high

school. The Office of Vocational Rehabilitation has proven remarkably effective in providing the deaf with training, including practical communication skills, needed for successful vocational placement.

Parental programs. Parents of a child having any impairment are usually more concerned as to the child's future. Tapping this concern can be a significant source for strengthening the child's educational program. Preschool programs and primary school grades are likely to have well developed parent groups. Frequently, staff members of the school are assigned to work regularly with parents. When educational plans are shared openly with parents, parents can reinforce and support these plans. Otherwise, the parent may be mistrustful and take a position of trying to shield the child from incursions by the school. Parents must also be relied upon for getting necessary medical, audiological, and other services needed by the hearing impaired child. All teachers working with the hearing impaired should have lists of names and locations of such supportive professionals in the area.

Summary

Education for the hearing impaired child is a complex and extended process. Early detection and a detailed assessment of the loss are essential first steps for an appropriate educational program. The services of many professional workers, physicians, social workers, audiologists, psychologists and educators must be integrated, and re-evaluations made on a regular basis to assure the appropriateness of the training. Amplification is playing an increasingly important role in habilitating the hearing impaired, but is far from being the solution for all problems. Extensive training is necessary for effective use of the hearing aid. The mode of communication appropriate for the hearing impaired is a highly controversial issue. Much effort is given to training communication skill despite the very limited success of any particular method. Training centers for the hearing impaired have moved out of residential schools into the community, but the hearing impaired still tend to be isolated from most social activities. In recent years, there has been a concentration of efforts to assist the hearing impaired, and many new technical and educational approaches are being tried. Among the more promising of these new developments are improved hearing aids, preschool programs, and greater utilization of parents to support and to reinforce educational objectives. In addition to the persistent problems regarding an appropriate communication method, techniques for securing real social integration and development of services for the hard of hearing remain pressing, unresolved problems in the education of the hearing impaired.